THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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CANNEL COAL.

RAMSAY'S NEWCASTLE CANNEL was discovered by the Advertiser in 1818. Cannel Coal was then little used in London: after surmounting much opposition, it has become the principal Cannel Coal used in the Metropolis, and has greatly assisted in improving the London gas. Its joint products of gas of high illuminating power, and coke of good quality, make it one of the most economical coals known. It is used by all the London Gas Companies, as well as by many Provincial and Foreign. The Crystal Palace was lighted from it in 1851, and the Post-office, Bank, and *Times* Office, are at present.

FIRE-CLAY RETORTS.

FIRE-BRICKS of all descriptions. Manufactory established in 1804.

RAMSAY'S GARESFIELD COAL and COKE.

Bone and Artificial Manures of all kinds.

Address G. H. RAMSAY, Offices, Broad-chare, Newcastle-on-Tyne.

April 27, 1854.

GAS COMPANIES

supplied with all the WORKING GAS BOOKS, GAS FORMS, &c., on the shortest notice. Also, SHARE CERTIFICATES and COMMON SEALS prepared in the best manner for all New Companies by

ALFRED DOUBBLE,

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TO be sold, a mile of two and three-inch GAS MAIN.

Application, for further particulars, to be made to Mr. WILLIAM WESLAKE, Secretary to the BARNET Gaslight and Coke Company.

Barnet, June, 1858.

GASHOLDER.

WANTED, a Second-hand Gasholder, with or without Tank, capable of containing from 20,000 to 40,000 cubic feet.

Apply, with particulars, to Mr. A. MALAM, Manager, Gas-Works, DUMFRIES, who has for sale a Gasholder and Cast-Metal Tank. Contents 11,000 cubic feet.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOS. COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE.

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE CLAY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire Clay Retorts in the United Kingdom; and orders for Fire Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their works as above.

COWEN'S GARESFIELD COAL AND COKE.

Coal and Coke Office,

QUAY SIDE, NEWCASTLE-ON-TYNE.

NOTICE.

THE Undersigned, having discovered that FIRE-BRICKS BEARING THE STAMP OF THEIR FIRM, BUT NOT MANUFACTURED BY THEM, and of a very inferior quality, are sold at the HAGUE, feel themselves bound, in defence of the well-established reputation of the goods manufactured by them, to put the public on their guard against the fraud, in order that they may not be imposed upon, and sustain loss by purchasing a spurious article.

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FIRE-BRICK MANUFACTURERS,

BLAYDON BURN,

NEWCASTLE-ON-TYNE.

TO ENGINEERS AND CONTRACTORS.

THE Directors of the Dundee Gas-LIGHT COMPANY are prepared to receive TENDERS for a TELESCOPIC GASHOLDER, 100 feet diameter by 50 feet in height, with Columns, Girders, &c., complete,—all according to Plans and Specifications, which can be seen on application to the Subscriber, to whom Sealed Tenders are to be delivered on or before Monday, the 28th inst.

The Directors do not bind themselves to accept the lowest or any Tender.

JOHN Z. KAY, Engineer.

Gas-Works, Dundee, June 12, 1858.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR,

begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

London Agents:

JAMES LAWRIE & CO.,

63, OLD BROAD STREET, CITY, LONDON.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,

THE OLD TUBE WORKS,

CHURCH HILL, WEDNESBURY,

STAFFORDSHIRE,

and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

The eminent Engineer, Mr. Perkins, confines himself altogether to the use of John Russell and Co.'s Tubes in his High-Pressure Steam Patents.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

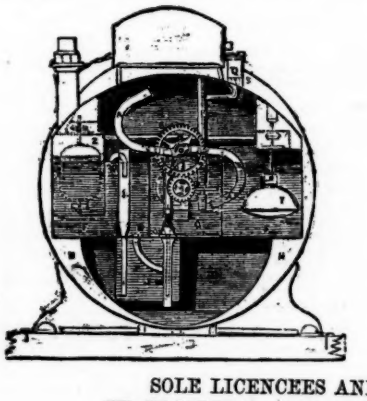
N.B. All Goods thoroughly Tested before sent out, and Warranted.

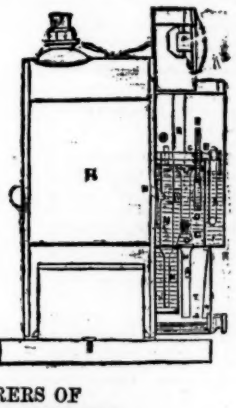
EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.





SOLE LICENCEES AND MANUFACTURERS OF

W. CROSLEY'S AND CROSLEY AND GOLDSMITH'S

PATENT STANDARD SELF-ADJUSTING AND COMPENSATING GAS-METERS,

By which the True Water-Line is constantly maintained, and accuracy of measurement at all times secured. SEVERAL THOUSANDS OF THEM HAVE BEEN FIXED, AND ARE NOW AT WORK, and numerous Testimonials from eminent Gas Engineers, expressive of their approbation of them, may be seen at the Manufacturers'.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENTAL METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. continue to manufacture ordinary WET METERS of the very best description, Mr. W. Crosley having been for many years the principal and confidential assistant of his relative, the late Mr. Samuel Crosley, of Cottage Lane, City Road, up to the time of his decease, in which capacity he communicated to W. C. the secret of the mixture of the metals which has rendered the Crosley Meter so durable and superior to all others, as is evidenced by a large number of them being still at work after having stood the test of nearly a quarter of a century's use.

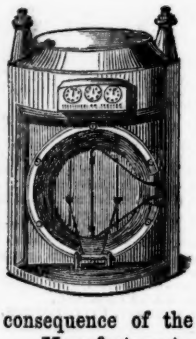
By Her Majesty's Royal Letters Patent.

JAMES MEACOCK,

PATENT DRY and IMPROVED WET GAS-METER WORKS,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.



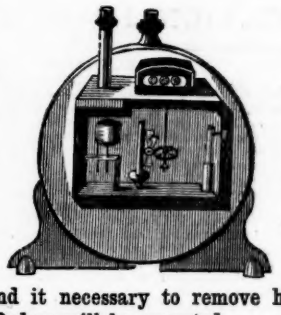
J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.



In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

WANTED, by a Steady Englishman, of seventeen years' practice (age 31), a SITUATION as Manager, Gas-Fitter, Main or Service-Layer, or to repair Meters and Lamps.

Address, E. J., 87, Manor Street, WATERFORD.

EUROPEAN GAS COMPANY. NOTICE is hereby given that the ANNUAL GENERAL MEETING of the PROPRIETORS will be held on WEDNESDAY, the 30th day of June, at the hour of Two o'Clock precisely, at the Office of the Company, No. 3, Moorgate Street, London, pursuant to the provisions of the Deed of Settlement.

Two Directors (Joseph Brown, Esq., and William White, Esq.), and one Auditor (John Moxon, Esq.), retire by rotation, but being eligible, will be proposed for re-election.

The Accounts to be submitted to the Proprietors will be open for inspection during 10 days preceding the meeting.

By order of the Board,
H. Mc L. BACKLER, Secretary.

3, Moorgate Street, London (E. C.),
June 11, 1858.

IN Chancery.—In the Matter of the SOUTH ESSEX GASLIGHT and COKE COMPANY'S WINDING-UP.

NOTICE is hereby given that the Gas-Works, Plant, &c., of this Company will be sold by TENDER on the 1st day of July next, at Two o'Clock in the afternoon, at the Chambers of the Vice-Chancellor Sir William Page Wood, No. 11, New Square, Lincoln's Inn.

Tenders must be sent in, on or before the 29th inst., to George Broom, Esq., the Official Liquidator, 35, Coleman Street, City; and on or before the 21st inst. proposed Tenderers must forward to him their Names, Addresses, and References.

Full particulars may be obtained, and a Copy of the Contract on the proposed Sale may be seen, on application to the Official Liquidator or his Solicitor.

As the Purchaser must be approved by the Lessor, Tenders must be considered as subject to such approval.

Dated this 5th day of June, 1858.

ROBERT PECKHAM,
4, Serjeant's Inn, Fleet Street.
Solicitor to the Official Liquidator.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

Defries' Prize-Medal Gas Baths, Gas-Cooking and Heating Stoves. The Polytechnic Gas Fire, with indestructible fuel, in daily operation (Saturday excepted) at the Office, 145, REGENT STREET, and the Manufactory, Euston Road, Fitzroy Square, LONDON.

THE PURIFYING-HOUSE SUPERSEDED.

MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) has the satisfaction to announce that Gas may now be purified in a manner that combines unusual commercial advantages with all the possible requirements of the sanitary officer and the public. All that need be said to call attention to the new process is, that instead of the purifying-house, two vessels of small area, placed after the condenser, suffice; that these vessels never have the least communication with the atmosphere; and that neither lime, oxide, nor any other substance foreign to the gas itself is brought into contact with it. Gas engineers will perceive among the advantages thus offered, economy in room, labour, and materials; impossibility of nuisance; and total absence of injury to the illuminating power.

Particulars by addressing RICHARD LAMING, 118, FENCHURCH STREET.

TO THE GAS COMPANIES OF GREAT BRITAIN AND THE CONTINENT.

CANNEL AND COAL FOR GAS PURPOSES.—Fifteen years' connexion with one of the largest Gas Concerns in England, enables us from practical experience to certify that the CANNEL and COAL we offer are those best suited for Gas purposes.

On application, we shall have much pleasure in forwarding our Tabulated Statements of Analyses, with Prices and Terms; also References as to respectability.

All Contract Orders have our careful and best attention.

EMANUEL TURNER and Co., Exporters of Cannel and Coal, 34, Castle Street, LIVERPOOL.

CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at

LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

LESMAHAGO GAS COAL.

JAMES FERGUSON and CO., Lessees of the Auchinheath and Craignethan Gas Coal-fields (the most extensive and valuable in the parish of Lesmahago), respectfully intimate to the Managers of Gas-Works and Consumers of Gas Coal, that he is prepared to ship the best quality of the above well-known COALS at Glasgow or Leith; and also to deliver them at the railway stations upon, or connected with, the Caledonian Railway, to any extent which may be required.

Price, free on board, or delivered at the railway stations, may be learned by addressing James Ferguson and Co., Gas-Coal Works, Lesmahago; or J. H. Jones, 1, Poets'-corner, Westminster, sole Agent for London.

Shipping Agent for Glasgow:
MR. ALEXANDER STRATTON,
159, WEST GEORGE STREET.

COAL TAR.

TO be let, the whole of the Coal Tar manufactured at the works of the Sunderland Gas Company, from the 1st day of July next, for one, two, or three years, as may be agreed upon.

The Directors will receive TENDERS until eleven o'clock on Wednesday, June 30.

JOHN H. COX, Secretary.

61, Pawcett Street, Sunderland,
June 1, 1858.

PATENT FLEXIBLE GAS TUBING, VULCANIZED INDIARUBBER HOSE-PIPES, WASHERS, PACKING, &c.

JAMES LYNE HANCOCK begs to announce a considerable REDUCTION in PRICE of his PATENT VULCANIZED INDIARUBBER TUBING.

VULCANIZED INDIARUBBER AIR-TIGHT BAGS, any size, for Gas Mains, with flexible tubes attached, and fitted with stop-cocks complete.

Manufactory and Warehouse, No. 6, Goswell Road, LONDON (E.C.).

CHARLES BOTTEN and SON,
ENGINEERS AND METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).

Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.

Also, High-pressure Cocks, Hydrants, Closets, and all Water-Fittings.

TO GAS COMPANIES.

J. W. GRAZEBROOK,
75, OLD BROAD STREET, LONDON,

Having applications for New and Second-hand Gas Apparatus, would be obliged by those Companies having Apparatus to dispose of, to send particulars. And Companies requiring Apparatus are solicited to apply.

PIPES, RETORTS, TANKS, GASHOLDERS, &c. on Shortest Notice.

STOURBRIDGE and NEWCASTLE FIRE GOODS.
CONTRACTS TAKEN.

TAR and GAS-WATER WANTED.—Particulars to Messrs. HILLS and Co., Warsash, SOUTHAMPTON.

WILLIAM RYDER,
GENERAL MINERAL AND METAL AGENT AND MERCHANT,
4, DEAN STREET,
NEWCASTLE-ON-TYNE,

is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.

Any communications addressed to him as above shall have prompt attention.

JAMES FEATHERSTONE,
ENGINEER,

Manufacturer of GASHOLDERS, IRON ROOFS, and every description of Gas Apparatus.

ALLIANCE IRON WORKS,
CLAYTON, near MANCHESTER.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE AND MIDDLESBRO'-ON-TEES.

Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

RICHARDSON and CO.,
ENGINEERS AND IRONFOUNDERS,
TUNNEL FOUNDRY AND SPRING GARDEN IRON-WORKS,
DUDLEY, near BIRMINGHAM,

Manufacturers of Gas and Water Apparatus, Steam-Engine Boilers, Single and Double Gasholders, Tanks, Bridges, Boats, Roofs, Valves, &c.

JOURNAL OF GAS LIGHTING
NEWSPAPER

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NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, July 6, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This JOURNAL has been duly registered at the General Post Office for transmission abroad.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 22, 1858.

NOTES UPON PASSING EVENTS.

"*L'opinion est la reine du monde,*" says the French proverb; which, being freely translated, means, "Humbug is the Queen of the day!" So, at least, we infer from the debates which have lately taken place upon the subject of competitive examinations; and so we interpret the remarks made by that shrewd observer, Sir Colin Campbell, upon the results of the institution of the Victoria Cross. The fact is, that, although the system of competitive examination may, to a certain extent, diminish the danger of the abuse of patronage to which our Administration was formerly unquestionably exposed, it is, after all, but a very unsatisfactory mode of establishing the relative merits of the candidates for office. Indeed, it is precisely on account of the impossibility of devising any real guarantee of the kind required, that we hold that the parental or bureaucratic system of government is so objectionable. When men govern themselves, they must, of course, bear the consequences of their own omissions or commissions; but when the State assumes the duty of protecting private interests, the sphere of action of its servants becomes so enlarged, that its responsibilities also become so serious as to render the selection of its agents a matter of grave national importance. Under Local Self-Government, moreover, there is an immediate and a personal supervision by those interested which would enable them to correct any error in the choice of public servants; but in highly organized bureaucracies, a man once in office remains there for life, unless he should happen to offend grossly against the law. It follows, therefore, that far greater precautions are required in the selection of the Government officials than would be required if the same duties were exercised by private parties. All past experience, however, shows that, even when Government officials are well-educated and well-selected—when their traditions and their practice are above reproach—they do not keep pace in the continually advancing wave with those who, having no official or recognized position, are always struggling for fame. We have only to look at what occurs amongst our neighbours in France or in Holland; and, whilst we confine our illustrations to the profession this JOURNAL is immediately connected with, it would suffice to observe the relative position of those countries and of our own in all matters connected with Engineering. Most unhesitatingly do we assert that, notwithstanding the transcendent abilities and the unimpeached honour of the foreign engineers, no great improvement of any description whatever can be attributed to them, if we except the introduction of Fresnel's lamps and reflectors; whilst, on the contrary, they systematically oppose everything like a change in the details of their profession. Of course, this sad result has been exaggerated here whenever our Administration has attempted to interfere with the details of public works, because we have no good official schools, and the traditions of our offices are far from being as respectable as those of other countries. To expect that the mere system of *cramming* will set this to rest is about as wise as to confide ourselves at any time to the tender mercies of the State; and, practically, the competitive examinations for the Civil Service have resulted in the regular organization of that easy method of deceiving the distributors of office.

One of the most valid objections to the selection of office-holders by the system of examination lately adopted consists in this: that the scholastic acquirements they ought theoretically to develop are no indications of the candidate's abilities for the peculiar position to which he aspires. We heard of a very able young man being rejected at one of the Indian Civil-Service examinations, because he could not tell the colour of the horse which Cæsar rode when he crossed the Rubicon. But, if he had been perfectly ignorant of Cæsar and his history, it by no means follows that the rejected candidate, in this case, might not have been precisely the best person to deal with an uneducated, semi-barbarous tribe. It is said that the man who passed the most brilliant examination for the above-named service did not conduct himself during the late crisis with either courage, skill, or even honesty. Yet these qualities are the most important for the representatives of a ruling race, whilst the competitive examination is powerless to detect their presence or their absence. It may prove a candidate's state of mental discipline at the moment; it can give no guarantee of character for the future.

What is to happen in the future, however, with the river Thames? When will it pass out of the hands of the chattering empirics, who have lately seized possession of the public, into those of men able and willing to grapple with the monstrous evil which exists in the very heart of our Metropolis? What a fearful responsibility rests upon Sir B. Hall and his advisers, for having wasted so long a period in the disgraceful contest he forced upon the Metropolitan Board! Every day seems to increase the nuisance of the river, and to prove the culpable folly of those who have forced the universal application of the water-closet system before the intercepting sewers had been constructed; whilst every day's experience equally proves the truth of the principle asserted by Messrs. Bidder and Hawksley, viz., that the influx of the tidal water is the most powerful cause of the decomposition of the sewerage. It seems to us that there must be some mental deficiency on the part of those who can still waste time in discussing the position of the outfalls of the intercepting sewers; because it is now evident that, let them be placed where they may, the waters they discharge must be disinfected before they are cast into the stream. Provided only that operation can be effected in a situation, or in a manner such as to be practically inoffensive, the nearer it is carried on to the Metropolis the better it will be; because the length, and the consequent cost, of the outfall sewers will, "*pro tanto,*" be diminished. But, whatever may be decided as to the precise mode of dealing with the Thames, it is certain that the most energetic measures are required to be immediately employed, if we would preserve our noble river from the fate of a Dutch canal, or the metropolitan population from some dreadful visitation. The evil, indeed, of the foul state of the river is not confined to the immediate shores of the Thames; but with every returning tide it invades the higher portions of the town, the foul smell rising through the gullyholes and the sinks of houses. Without being alarmists, we declare that the present state of the river is one which must inspire serious anxiety to all parties; and that all minor differences of opinion ought to be waived, to allow a prompt solution of the problem of its improvement.

The extraordinary heat of the present season, combined with the comparative drought of late years, has, perhaps, made the fearful state of the Thames more apparent than it

would have been had the temperature been less. It is worthy of remark that this abnormal state of the atmosphere has equally affected other localities; and we observe that, both in the Fen districts of Lincolnshire and in Holland (especially in the province of Friesland), the marsh fevers have of late been very prevalent and very malignant. We are convinced that the greatest evil the inhabitants of these particular districts have to contend with is the bad quality of the water they drink; and that much of the disease they suffer would be removed by the use of a system of chemical filtration which should remove the injurious properties of the water. Generally speaking, the source of water supply in these districts is either by the collection of the rain in tanks, or in the formation of shallow wells. The water in the former case must always be flat and insipid, and it must be devoid of the carbonic acid gas so necessary for the proper discharge of the function of digestion; in the latter case, the well waters must be affected by the peat and other vegetable matters which abound in all Fen countries, whilst the organic matters of the farm-yards almost invariably find their way into the wells. It would be difficult to separate the impurities thus taken up; but we believe the use of some such apparatus as Ransome's chemical filters would effect a great improvement. In fact, what is required is, that the water should be made to traverse two slabs of filtering material and a layer of animal charcoal. Many other filters than Ransome's would no doubt effect this object equally well: we only cite the former because we know their value by practical experience.

Our old friends, the Worthing Local Board of Health, have lately "damned themselves to everlasting fame" by their conduct in the recent action brought against them by the contractor for their sewerage and water-works, Mr. Friend. Even the Judges were compelled to stigmatize the defence of the Board as a very disgraceful one; and the *Times* itself was forced to blame the people at Worthing, although the particular action it thundered against was only one of a character almost naturally to be expected from the *protégés* of the General Board of Health which the *Times* seems to admire so much. "Public bodies," said Chief Justice Cockburn, "have no souls to be saved, and therefore no consciences;" but how he could have expressed indignation against the Worthing people in this case, after he had himself given the very strange advice he did in the case of the *Dover Local Board of Health v. the Dover Gas and Water Company*, must be a mystery, unless it be explained on the ground that "the case is altered." Now he presides on the Bench, and is thence compelled to have more strict notions of honour than he had when practising at the Bar. Two wrongs, however, never make a right, so the Worthing Local Board must bear its fair share of public reprobation; and we hope that the lesson will neither be lost on the public or on the Legislature. The former must learn never to trust Local Boards of Health, unless under protection of the letter of the law; the latter ought to pause before it increases the power and influence of such bodies.

The decision in the case *Higgs v. Goodwin* is, we believe, generally regarded with satisfaction, as the establishment of anything like a patent for the use of lime to precipitate sewerage matters would unquestionably be of serious consequence to society at large. Law is proverbially uncertain; and surely this case may be referred to as an illustration of the truth of the opinion. There have been already two decisions of a character diametrically opposed to one another; and latterly, in making absolute the rule for a new trial, the Court of Queen's Bench have upset all the principles hitherto supposed to have been settled. Truly, the legal mind is a mystery!

And yet some such acute criticism is requisite to check the shameful carelessness with which Acts of Parliament have been drawn up of late years. The Governmental Bill draughtsmen forget that words are things, and they have thus opened the door to almost endless litigation. Thus, for instance, the case of the *Poplar Board of Works v. Knight* may be cited as an illustration of the danger of losing sight of the original meaning of a word; and Sir B. Hall, by his ignorance of English etymology, seems therein to have exposed the whole of a wealthy and important district to serious danger. Sir B. Hall and his colleagues, who drew the Metropolis Management Act, forget that *Sewer* originally meant *Shore;* and, not caring to study the details of one of his own measures, he neglected to provide for the safety of the *sewers*, which actually performed their original function, whilst he seems only to have thought of the sewers in the ordinary application of the word. The Solon of Whitechapel and Judge Crampton seem, indeed, to have believed that the Legislature had really made no provision for the safety of the *shore walls* of the Isle of Dogs; and so absurdly is the Statute worded, that there is strong reason for suspecting that Lord Campbell gave the Legislature credit for more wisdom than it possessed, when he discovered the *general* and the *specific* senses in which the word had been used. On a third trial it would in no wise surprise us to find that the court would rule that a sea-wall or *shore* was not a *sewer* under the terms of the boasted Act for the better Management of the Metropolis; and as the various Local Boards of Works are preparing suggestions for the improvement of that measure, it might, perhaps, be advisable to insert some clause with reference to this important matter. We would add, as further illustrations of the value of words, that a definition of *breeze*, or of *ashes*, would have saved the Worthing Local Board of Health its first appearance in a court of law; and that authoritative definitions of the words *coal* and *mineral* would have saved much money and much hard swearing some years since. The Dictionary of Technical Terms, now in course of publication by the Architectural Publications Society, will do much good in this matter; but it is hardly general enough, especially as it entirely omits the definition of the terms of abstract science.

Reverting, however, to municipal matters, we would observe that the Report by Dr. Liddle on the Sanitary Condition of the Whitechapel District must convince the London Manufacturers that they are still under close and almost hostile inspection. Pointed allusion is made in this document (whose general tone is worthy of much commendation, by the way) to trade nuisances; and really, if, as Dr. Liddle says, "they can all be easily mitigated if ordinary care be taken by the proprietors," there can be no reason for not vigorously attacking them. The local authorities are precisely the persons who ought to act in such cases; and Dr. Liddle may be sure that public opinion will support him so long as he exercises his power discreetly and moderately. The danger to be feared is that the local authorities may either be partial, or that their advisers may become "crotchety;" and Dr. Liddle's allusion to the smoke nuisance induces us to suspect that he has a tendency to that defect. We hope that he will excuse us when we urge him to recollect, in his prosecutions of so-called trade nuisances, that it often happens that the men he, and such as he, seek to protect, positively live by the trades so stigmatized; and again we say to such enthusiasts in hygienic science, "Do not deprive the poor of the means of earning their living, whilst you affect to protect their lives."

At Northampton the Surveyor under the Improvement Act has lately issued a Report calculated to frighten the inhabitants of the town out of their propriety. He tells the inhabitants that their town is riddled with cesspools, and that ultimately the percolations from the latter must affect the quality of their water supply. This may be true so far as the small private wells are concerned; but the Northampton people may be at ease with respect to the quality of the water supplied by the Company. There is a thickness of about 130 feet of the alternate impermeable clays and limestones of the lias formation between the diluvial bed which forms the surface of the ground near the Company's well and the marls of the new red sandstone formation from which it derives its supply, by means of a boring carried down to 250 feet from the surface. It would thus be impossible for any sewerage infiltration to pass through the lias; so that there is no occasion to resort to a system of water-closets and drains on this score. We would urge the authorities of Northampton to pause ere they enter upon any blind imitation of the Chadwickian School in this practical detail; for it is, we repeat, quite as essential to dispose of the sewerage at the outfall as it is to get it there; and the state of the Thames, so often referred to, ought to teach hesitation in the matter. It may be that the Northampton cesspools are particularly bad; but certainly it would be injudicious to attempt any sudden and radical change until precautions have been taken to prevent that change from becoming itself a more gigantic evil than the one it is sought to remedy. As to the accusation brought against the Water Company that it does not supply water enough, we can only say that at present the charge does not appear to be proved; at any rate, we suspect strongly that the limit to the Company's distribution lies rather with the consumers than with the sellers. The Surveyor's Report

is more than usually vague and unsatisfactory in all that regards the accusation against the Company.

We regret to notice in the foreign journals the deaths of two eminent Hydraulic Engineers, MM. Mont Richer and Darcy. The first of these gentlemen had achieved to himself a world-wide reputation by the execution of the water supply of Marseilles; the latter, by the execution of the water-works of Dijon, and the publication of some very interesting books upon the science of Hydraulic Engineering.

We must reserve our observations upon the South Kensington "Boilers," the state of the Thames Committee, and the Public Health Bill, to a future occasion. There might be a breach of privilege if we were to do so at present.

Circular to Gas Companies.

THE parliamentary inquiry into the supply of gas to the metropolis has not made much progress, but the preliminary arrangements and the proceedings, so far as they have gone, afford strong indications of the feelings of the committee, and of the probable result of their labours.

The committee met on Thursday, the 10th inst., with closed doors, to complete the arrangements for conducting the inquiry—Mr. Mowbray, one of the members nominated by the Government, occupying the chair—and, after sitting for two hours, adjourned for a week. Four members of the committee—Sir Benjamin Hall, Sir John Shelley, Mr. Byng, and Mr. Jackson—remained to have a conference with the parties representing the gas companies and the representatives of the consumers, who were then admitted into the committee-room for the purpose. Our reporter was commencing to take notes when he was prevented from doing so, on the ground that what then transpired was not to be considered as part of the proceedings of the committee. We cannot appreciate the wisdom of this prevention, for, as the communication to the parties present was intended to be reported to the parishioners and to the gas companies, it would surely have been as well that the matters to be reported should have been noted down at the time, as that they should be entrusted entirely to memory.

Sir Benjamin Hall informed the representatives of the parishes that for the purposes of the inquiry the committee had parcelled out the metropolis among their five members;—that he had taken Finsbury and Marylebone; Sir John Shelley, Westminster; Mr. Byng, the Tower Hamlets; Mr. Locke, Southwark; and Mr. Roupell, Lambeth. This "districting arrangement" has been adopted to facilitate the collection of the evidence to be submitted to the committee, so that those inhabiting each district might communicate to their respective representatives the names of the witnesses they wished to have examined. Sir Benjamin suggested that before the next meeting of the committee the delegates should definitively arrange among themselves what provisions it is desirable should be introduced for their protection in any general Act, if the committee should be of opinion that legislation on the subject is desirable. He stated that the committee wished to ascertain whether, if the gas companies consented to come under the provisions of the Gas-Works Clauses Act, that would meet the views of the promoters of this movement; and he alluded to the provisions of the Imperial Company's Act of 1854 as desirable to be incorporated in any Act for the regulation of the gas supply of the metropolis.

The next member of the committee who took part in the conference was Mr. Jackson, one of those nominated on behalf of the gas companies, who said he had been requested to remain because it was well known he had been extensively connected with the management of gas-works, and with the progress of gas bills in the House of Commons. He stated at the same time that he is not at present connected with any gas company, as he had been deprived of his interest in such concerns by the proceedings in another committee-room—alluding to the Birkenhead Gas and Water Bill.

Mr. Jackson made some suggestions for the settlement of the present question which he thought would meet the views of all parties. These suggestions were to the following effect:—That in any Act to be passed there should be clauses inserted limiting the dividends to be received by the gas companies, and the price to be charged for gas—limiting also the remuneration to be paid to the directors; that the illuminating power of the gas should be fixed, and that the metropolitan parishes should be authorized to appoint one person to inspect and test the meters and another to test the quality of the gas, both officers to be paid by the companies. He suggested also that it might be desirable to insert a provision similar to the clause he introduced into the Sheffield Gas Bill, to prevent any extravagant expenditure by the directors by which the price of gas might be kept up to its maximum. By that clause the corporation were authorized to appoint a certain number of their own members to sit as *ex officio* directors, to watch over the interests of the public. That clause, he said, had worked well in Sheffield. If such securities as these were given to the consumers, he thought they would be sufficiently protected, and there was no doubt they would be benefited by the districting arrangements which had created so much alarm. It was quite evident, he said, that one company could supply a district much better than two, and the public would derive the additional advantage that the streets would not be so frequently broken up, and the leakage of gas would be diminished. With respect to the public lights, Mr. Jackson condemned the system which practically prevails at present of making private consumers of gas pay any portion of the cost of lighting the streets for the benefit of those who burn no gas themselves; and he thought that one of the results of the present inquiry should be an arrangement similar to the one he was the means of introducing into the Norwich Gas Company's Bill, fixing the price to be paid for the public lamps at the lowest charge made to any private consumer. He cautioned the gas consumers of the metropolis against being led astray by the example of Manchester to purchase gas-works from the companies, for nothing could be more fallacious than the expectation of public benefit from such a proceeding. They should rather follow the example of Liverpool, where the purest gas is supplied at the low price of 3s. 9d. per 1000 feet; and he said that, from information he had received, he believed there would be some difficulty in keeping up the price even to 3s. 6d. for 18-candle gas.

The attention of Mr. Jackson having been drawn by one of the parties present to the question of pressure, he was understood to say that it is so clearly to the interest of the gas companies to force as much gas as possible through the consumers' pipes, that they might rely upon getting a sufficient pressure at all times. On this point, however, he must surely have been misunderstood, for, with his great experience in gas matters, he must be aware that any excess of pressure beyond what is required for the efficient lighting of a district, produces unnecessary leakage, and consequently enhances the cost of the gas when it reaches the consumer's burner. When Mr. Jackson was further asked whether the gas companies had agreed to accept his suggestions, he said he had not the slightest idea whether they would or not, as he is not in any way connected with them, and is not acquainted with any of the directors.

In some remarks by Sir John Shelley, he let out that the committee had that morning debated, but had not decided, whether or no the parties should be represented by counsel. He said that, but for the assistance of Sir Benjamin Hall, he should not, as a representative of the interests of the parishioners, like to face the array of talent which the gas companies, through their officers, would bring to bear on the subject. The committee, he observed, would have to fight the battle of the consumers, and he suggested, therefore, that they should take care to make out a clear case. He advised the consumers not to be too stiff in their demands, and to bear in mind that those who have embarked their capital in such undertakings ought to have proper interest for their money. Sir John Shelley said he had heard that day for the first time that the gas companies were willing to place themselves under the provisions of the Gas Clauses Act, 1847, and he thought that, if a proper spirit of conciliation were manifested on both sides, there would be no difficulty in bringing the inquiry to a satisfactory termination.

It was then arranged between Dr. Bachhoffner and the members of the committee who are nominees of the parishes, that the delegates should meet on the following Monday, to consider the suggestions that had been made to them, and that they should report the result on Tuesday.

The foregoing is, we believe, substantially a correct account of what occurred at the interview between the four members of the committee and the few representatives of the gas consumers and of the companies who remained in waiting after the adjournment had taken place. It will be seen that the parties interested have both equal reason to exclaim, in the words of the adage, "Save us from our friends, and from our

enemies we will protect ourselves!" for while the members nominated to support the interests of the metropolitan parishes seem inclined to abandon their clients to such protection as the Gas Clauses Act will afford them against the dreaded "tyrannical monopoly" of the gas companies, without any fixed maximum price or standard of quality; a member nominated by the gas companies, on the other hand, suggests that a certain number of parish agitators should be *ex officio* directors on the boards of each gas company! We admit that the system has worked well in Sheffield, but the circumstances of that case are not parallel with the state of things existing in London; and if the honourable member will take the trouble to inquire how it has worked in the case of the Leicester Water-Works Company, he will find many and serious objections to its indiscriminate adoption.

The committee met again on Thursday last, and sat for some time with closed doors. We understand that in the meantime proposals were made on behalf of the delegates to withdraw from the inquiry if the gas companies would consent to place themselves under the Gas-Works Clauses Act of 1847, and the protecting clauses of the Imperial Act of 1854, with limitations on the price of Newcastle coal gas of 5s. 3d. per 1000, and proportionally higher prices for cannel gas. This offer was declined by the gas companies on the ground that it would be more satisfactory to have the whole subject of the gas supply of the metropolis thoroughly investigated and settled by well-considered legislation, and thus shut the door effectually against further agitation.

When the parties were called into the committee-room, the proceedings commenced by the examination of witnesses (without the assistance of counsel) to establish the case against the gas companies. The remainder of the day was spent in the examination and cross-examination of Dr. Challice, whose evidence, adduced to show the necessity of parliamentary interference with the gas companies, completely broke down, as will be seen from the full report inserted in another part of the JOURNAL.

Dr. Challice, in addition to being the medical officer of health for Bermondsey, has the honour to be President of "The South London Gas Consumers' Mutual Protection Society," on whose behalf he undertook to prove how greatly the interests of the consumers were prejudiced by the districting arrangements. It so happens, unfortunately for the commencement of the proceedings of the agitators, that the views of the President of the South London &c. Society differ from those of the parochial delegates as to the objects to be gained by the inquiry; for, whilst he and "the society with the long name" look to the interests of the private consumers alone, the parochial authorities are wanting to secure a lower price for the public lights. Both parties, however, are mutually sympathetic in their fears of gas monopoly, and they have thus joined together against the companies. But the M.D. and P.S.L.G.C.M.P.S. who was put prominently forward to fight the battle of the discontented consumers, succeeded only in showing how little he knows about gas, and that victory would be worse for them than defeat.

We entertain too high an opinion of a gentleman with half the alphabet attached to his name to suspect he would treacherously sell himself to the gas companies, but, he could not have served their purpose better had he been fee'd by them for the occasion. The principal part of his attack was directed against the Surrey Gas Consumers' Company, which company is districted by Act of Parliament, and is, moreover, subjected to some of the provisions which it is now sought to impose on all the gas companies as a complete protection to the consumers—including a limitation of dividends, a maximum price, a minimum quality, and an inspection of meters. Thus, according to the evidence of the first witness examined on the part of the agitators, if they gained what they require, they might be much worse off than they are now. As to a maximum price—that *vade mecum* of all gas reformers, the assumed palladium against oppression—he throws it overboard altogether, regarding it but as an authorized instrument of extortion, unless it be screwed down to the lowest possible price attainable under the most favourable circumstances. The learned President of the South London &c. Society was inclined to prefer, even in that case, a sliding scale, to be regulated by the varying cost of coals and materials, but he admitted he did not see how such a plan could be rendered practicable. In short, he was obliged to abandon altogether the notion of regulating the charge for gas either by a fixed maximum price or by a fluctuating scale.

Dr. Challice's evidence as to the effect of the districting arrangements, which have given rise to the agitation for inquiry, and against which so much parochial eloquence has been directed, was still more damaging to the cause he was called to support. He stated that in his opinion it is a bad thing to have the pipes of different companies running through the same street; that since the districting in South London less capital is required; that the leakage has been diminished "from 20 or 30 per cent. to something like 5 or 7;" that there has been an enormous saving of money; and, furthermore, that the public health is improved. Having stated all this, the learned President was obliged to admit that, "if the consumers were properly protected, the division of the metropolis would be beneficial." Thus, then, after all the outcry that has been raised against this arrangement by the gas companies, the very first witness called to prove it to be a grievance, admits that it will not only be greatly advantageous to the gas companies, but highly beneficial to the public.

A more complete break down of a case of alleged grievance, on its first coming before a court of inquiry, could scarcely have been thought possible; but the learned President, not content with thus demolishing the grievance itself, went out of his way to give the *coup-de-grace* to one of its fancied remedies. Competition is the favourite panacea for all grievances, fancied or real, inflicted by public companies; it is of the absence of competition that the metropolitan parishes now complain, and their delegates threatened to establish competition as the means of obtaining a fair price and liberal treatment. Competition has run its course in South London, and the witness who represents the consumers of that district thus speaks of its effects:—"It was thought advisable at that time to start a new company for the purpose of bringing down the price. Since then, *the company that was started to bring the others down has become the greatest sinner of the whole.*" And again: "The effect of competition with the companies on our side the water has been combination; and *the public have suffered by competition through combination.* I believe, if the inhabitants of Southwark were polled, they would say they were better off before. We think the new company have betrayed us by selling themselves to the other companies. *That would be the case if another company started; competition becomes combination.*"

The gas companies should reward the learned Doctor with a heavy fee for thus annihilating the apprehended grievances and their proposed remedies. The actual grievances he complained of as existing in his district are of a trivial character. They were stated so vaguely as scarcely to deserve attention; and we understand that the companies are prepared to rebut most of his assertions respecting the arbitrary treatment of small consumers. Of the only company of which he was able to speak from his own knowledge—the South Metropolitan—the witness had nothing to complain, and, as regards the others, he gave his evidence in so loose a manner that he was often rebuked by the committee. His statement that the Phœnix Company have applied money out of revenue for purposes of capital is contradicted by the audited accounts of the company, which he does not seem to have comprehended, though he says he had the assistance of a friend in reading the report.

The committee, we must confess, at times bore rather hard on the medical officer of health for Bermondsey, and seemed inclined to make fun of him and "the society with the long name" which he represented. It was, to be sure, rather tempting game to expose his glaring ignorance of the matters of which he came to complain. Dr. Challice has, nevertheless, done good service, for his evidence has unquestionably tended to shorten the duration of the martyrdom to which the committee are doomed in being compelled to listen to such twaddle.

In the present session of Parliament two important precedents have been established which will probably be introduced into most future Gas Acts. One renders it compulsory on the company to supply gas to any owner or occupier of premises situated within 15 yards of an existing main, and the other compels the company to supply meters on hire at rents specified in the Act. The clause establishing the first of these principles, which has been inserted in the Sculcoates and Kingston-upon-Hull, the Norwich, the Luton Bills, and probably in others, is to the following effect:—

> Upon the application of the owner or occupier of any buildings or premises within 15 yards of any main laid down within the limits of this Act, the company shall supply gas as may be required to such buildings or premises, and that although there may be rent in arrear for gas supplied to a former tenant of such buildings or premises; and if for the

space of 10 days after such application, and a deposit of a reasonable sum, as hereinafter mentioned, if required, the company shall neglect to supply gas as required, they shall forfeit and pay a sum of £5, and the like sum for every day during which such neglect shall continue: Provided that the company shall not be compelled to lay down mains where none exist, and provided that the company may, if they think fit, require a reasonable sum, according to the number and size of the lights required by such owner or occupier, to be deposited with them as a security for the payment of the gas-rent to become due to the company for the period for which such buildings or premises shall be required by such owner or occupier to be lighted.

The Sculcoates Bill fixes the charge for the hire of meters according to the following scale :—

The charges which the company may make for the use of meters supplied by them shall not exceed the following rents (to wit):—

For a 2-light meter, at and after the rate of						3s.	per annum.
„	3	„	„	„	„	4s.	„
„	5	„	„	„	„	6s.	„
„	10	„	„	„	„	10s.	„
„	20	„	„	„	„	16s.	„
„	30	„	„	„	„	18s.	„
„	45	„	„	„	„	£1. 2s.	„
„	60	„	„	„	„	£1. 8s.	„
„	80	„	„	„	„	£1. 12s.	„
„	100	„	„	„	„	£2. 0s.	„

For any meter exceeding a 100-light meter, and not exceeding 150-light meter, £2. 16s. per annum; and for any meter exceeding a 150-light meter, at a proportionate rate.

In the Luton Bill the rate is fixed at 12½ per cent. on the retail price of the meters.

Register of New Patents.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED PATENT.

1195.—Vincent Louis Vodoz, of the Westminster Club, Albemarle Street, London, for "*An improvement on the chimneys and glasses of gas and other lamps.*" May 27, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED PATENTS.

164.—Richard Archibald Brooman, of 166, Fleet Street, London, for "*Improvements in apparatus for measuring water, gas, and other liquids.*" Jan. 29, 1858.

168.—Herbert William Hart, of Birmingham, in the co. of Warwick, gas engineer, for "*Improvements in regulating the pressure of gas.*" Jan. 29, 1858.

187.—William Cartwright Holmes and William Hollingshead, of Huddersfield, in the co. of York, gas engineers, for "*Improvements in the manufacture of gas and in apparatus employed therein.*" Feb. 2, 1858.

197.—Ernest François Dillage, of 14, Boulevard Poissonnière, Paris, manager of the Continual Motion, Hydraulic, and Atmospherical Apparatus (on Lassère's system) Company, for "*Improvements in machinery or apparatus for raising, forcing, and exhausting fluids, air, and gases.*" Feb. 3, 1858.

218.—Samuel Williamson, of Hanover Street, Cork, Ireland, tin-plate worker and japanner, for "*Improvements in the construction and mode of affixing street and other gas-lamps or lanterns.*" Feb. 5, 1858.

287.—George Lindsey Blyth, of Derby Street, Parliament Street, Westminster, London, analytical consulting chemist, for "*An improvement in the manufacture of manure from sewerage waters and other fluids containing ammonia or nitrogenous matters.*" Feb. 28, 1858.

325.—William Clark, of 53, Chancery Lane, London, engineer and patent agent, for "*Improvements in filtering water and in apparatus for the same.*" Feb. 19, 1858.

1099.—Charles Weightman Harrison, of Woolwich, Kent, civil engineer, for "*Improvements in obtaining light by electricity.*" May 17, 1858.

1107.—Alexander Angus Croll, of Coleman Street, London, engineer, for "*Improvements in the treatment of sulphate of alumina and in obtaining alum.*" May 18, 1858.

1133.—John Adamson, of St. John Street Road, London, mechanic, for "*Improvements in the manufacture of parts of gas-meters.*" May 21 1858.

Parliamentary Intelligence.

MR. GOLDSWORTHY GURNEY'S PLAN FOR THE PURIFICATION OF THE THAMES.

THURSDAY, JUNE 3.

The Select Committee appointed to inquire into the merits of the report and plan submitted by Mr. Goldsworthy Gurney to the late First Commissioner of Works, on the best means for preventing the further pollution of the river Thames and the atmosphere about the Houses of Parliament, met this day at twelve o'clock.

The committee consists of the following members:—

Mr. Akroyd, Mr. Bouverie, Sir J. Y. Buller, Mr. Cayley, Alderman Cubitt, Viscount Goderich, Sir B. Hall, Mr. Kendall, Mr. Locke, Lord John Manners, Viscount Palmerston, Mr. Percy, Mr. Roupell, Lord John Russell, Sir John Shelley, Mr. Robert Stephenson, and Mr. Tite. Mr. Kendall occupied the chair.

Mr. *Gurney* was under examination the whole of the day, but his evidence was given in so low and indistinct a tone of voice, that it was with great difficulty he was heard beyond the committee table. In reply to questions proposed by the chairman, he was understood to say: I am a Cornish man, and a magistrate of the counties of Cornwall and Devon. I began life as a medical man in the year 1816. I have now the management of the warming and ventilating departments of both Houses of Parliament. During the progress of the building I was called up and examined in the House of Lords, and I showed to the satisfaction of the peers that I was fully acquainted with the principles of ventilation and the necessity of making some alteration in the building. My attention was first directed to the subject of the ventilation of sewers in consequence of the cholera which some years ago raged in this neighbourhood. At that time there was a sewer in Friar Street in the Borough in a very foul state, and which could not be cleaned. I offered to blow it out by the steam jet, and accomplished the object. Since then my attention has been called to the subject on several occasions, but more particularly in connexion with this House, as I found the vapours from the sewers very largely interfered with its comfort; I therefore felt it my duty to report upon their state and condition. I found upon examination that the nuisance arose from the emanations occasioned by the discharge of gaseous effluvia from the mouth of the sewer near the bridge, and I recommended that the sewer should be trapped. The Commissioners of Sewers, however, did not do it, and there was no power to compel them to do so. But Lord Palmerston promised it should be attended to, and since it has been trapped there have been no emanations from it until towards the end of last session, and again on Monday last. I believe it arose in the first instance from the trapping of the sewer having been suddenly washed away, and, latterly, from the trap being removed during the works going on in carrying the Victoria sewer down Bridge Street. In 1842 I fully considered the subject in consequence of plans having been advertised for by the Commissioners of Sewers, when I sent in a proposition. From that time to the present I have only had a general connexion with the question until desired by the First Commissioner of Works to look more closely into it, which I did, and, as the result, I published a report, which I believe is before the House.

The Chairman: From the investigations which were necessary in order to make that report, are you led to believe that you can remedy the evil, especially in the neighbourhood of the Houses of Parliament?

Mr. *Gurney:* I believe so, as far as the deductions from data go, and I think they are correct. From them I should say there is no doubt of it, and that it could be done at a not very large expense. Indeed, the cost would be trifling as compared with other plans which have been proposed. I think the expense of cleansing the whole of the river would not be very serious.

The Chairman: Give the committee your ideas upon the subject.

Mr. *Gurney* (producing plans): I presume the committee have read my report, and that they are familiar with the data upon which the plan proposed is grounded.

The Chairman: I think you had better not assume that, but go into the matter generally.

Mr. *Gurney:* Then I am afraid I must read the report.

Sir B. Hall: I understand the report to be a general summary of your views, and I think our examination must be into the details of the plan by which you propose to effect your object, just as though we had not seen your report.

Mr. *Gurney:* The first conclusion I come to is, that a mistake has been made with respect to the specific gravity of insoluble sewerage, and that this question lies at the foundation of all plans likely to be effective, because upon this entirely depends the mode of getting rid of the mud and filth at present deposited on the sides of the river. In round numbers, I should say the specific gravity of the insoluble portions of sewerage is as 1 to 3. Taking distilled water as my datum line at 1000, sewerage is 1325. From this it would appear that, by virtue of its specific gravity, sewerage would fall wherever there was a slack or slow current. It would therefore be deposited mostly on the sides of the river where the eddies along shore affect it, and where there are retrogrades. It is this which gives the peculiar character to the river, and accounts for the sewerage being retained there at all. That sewerage is retained in the river we have ocular demonstration, and the cause, I believe, from a number of experiments I have made, to be as I have stated. I found, upon examination, that the deposits of mud on the sides of the river were occasioned by the interruptions and obstructions to the regular flow of the water up and down the stream. It then becomes a common sense question that the removal of these obstructions would remedy the evil. All that falls into the middle of the river is carried away. This (producing a map) is a rough drawing of the river Thames between Vauxhall and Hungerford, and is taken from Mr. Walker's report, which I presume to be correct. The brown tint on the sides represents the mud and gravel. I find from observations and from operations carried on on the river, which are perhaps the best guide, that at an inclination of the banks of the extent of 1 in 12, or in some parts 1 in 16, the mud will run down of itself. Therefore, I propose that the bank on this side of the river should be made of an inclination of 1 in 12, and the opposite bend, which is always clean, should be 1 in 15. In order to get that, we must move the low water line, which I propose to bring within 50 yards of the shore the whole way, and the gravel dredged out of one part will form the material to make up the other. The water-way will be brought up close to the wall, the navigation of the river will thus be improved, the mud on the banks will be washed away, and there will be no retrogrades and no obstructions. I dredge along these two dotted lines (referring to plan), and make that part of the river three or six feet deeper than other parts.

The Chairman: You propose that each bank of the river should have a uniform wharf shore, which you would make by the materials taken from other parts of the river. Will that supply all you want?

Mr. *Gurney:* Yes. I find it would take 60,000 cubic yards to complete it between Vauxhall and Waterloo Bridges. The worst part is at Hungerford, and what is taken out from there will be sufficient to make the bank uniform. By this plan the wharfage will not be injured but benefited.

The Chairman: After having made the wharf shore, will it stand?

Mr. *Gurney:* I have no doubt of it; there is nothing to disturb it. I am led to this conclusion from the common sense view of the case, and from actual experiments which I have made. In August last I had some gravel placed in the river just out here, which has not been disturbed. The steamers and the freshets will not disturb it. The depth at low water is from twelve to 15 feet. A large quantity of the soil I propose to take up is gravel. The sloping bank will be from the present summit of the level of the shore down to low water. It is a question of prudence not to interfere with the shore at the wharves. From high water the lowest part of the bank will be from 19 to 20 feet. The width of the bank will be 50 yards, the width of the greatest channel 30 yards. Contractors have agreed to dredge it and deposit the materials at 1s. 6d. per yard; the expense will thus be somewhere about £7000. The soil below the bed of the river is level. I believe that a bank at that angle would maintain its position. On the other side, against Battersea Park, it is more inclined, but I do not think it necessary for my purpose. I estimate that the tide will run down at about two miles an hour, and at that rate it will not affect the bank.

By the Committee: I intend to start at eight feet below Trinity high-water mark from the wharf wall, and for 50 yards would make it one uniform slope, varying from 1 in 12 to 1 in 14. Dredging would begin at that distance, and the middle of the river be left to take its chance. The present state of the river is the result of natural causes added to neglect. A very little attention would have prevented it. I am of opinion that I can maintain my

artificial system of deep water channels, notwithstanding the effects which we now see produced by natural causes in the river. With reference to the commercial side of the question, I believe the owners of the wharves would prefer a uniform bed to an uneven one. I have applied to many wharfingers, and they all think that the approach to their premises would be improved, and that the bed upon which their boats lie would not be injured. No doubt the circumstance of having deep water at a wharf increases its value. Supposing these channels were dredged, I believe they would not fill up again, but would maintain themselves. There would be nothing to disturb them then as there is now.

By Alderman CUBITT: I reckon upon finding gravel all along my 50 yards. By depositing gravel upon the mud you would get rid of it.

By Mr. TITE: The sectional area of the water-way will be the same. I do not propose to contract the surface of the river at high-water mark at all.

By Sir B. HALL: My plan is to have a uniform bank on each side, with a gravel surface, inclining 1 in 12, with a deep channel at the bottom of the bank, leaving the centre of the river to take care of itself. I propose to alter the current which is indicated on the map by making a deeper one on each side, so that the water may take the artificial ones instead of the natural ones. At present the gravel bed here (pointing to map) is an obstruction, and causes the water to flow directly to the opposite bank; but by making the inclination greater on this side I shall prevent this. By making the artificial channels as uniform as possible, 50 yards from the shore, it will have the effect of counteracting the natural action of the river, which now causes the current when it strikes against one side to flow off to the other. The angle at Waterloo Bridge, though large upon the map, does not practically affect the question. The radius of the curve is so great, and the curve so gradual, that it would not affect the flow of the water. The channels will not become deposits for the rubbish or filth brought down by the flood, because the rate at which the water flows will be sufficient to carry it away. I think that a bank of 1 in 12, no matter whether made of loose gravel or otherwise, will maintain its incline under any circumstances, because the great weight of the water, even in freshets, will be upon the channels. There is a law called the law of *vena contracta* which has been very much overlooked, but by which the obstruction is less in these channels than elsewhere. I am aware of the fact of the difference of the level of the river in its longitudinal section in deep water channels; but I know that the steamboats always go down the deep bed of the channel, and always have enough water; still I think it might be desirable to pass the dredge over to take all the higher parts. The same thing will not happen in the channels which I propose to create, because we begin at a uniform depth, and I see no reason why they should be disturbed. On the north side of Waterloo Bridge my channel would go into the present deep water channel, which is close to the shore. It is clean gravel all the way. I do not know the depth of it.

Alderman CUBITT: In the bed of the river at Westminster Bridge there is from 3 to 15 feet of gravel, and under that the London clay.

By the COMMITTEE: At present I only propose, as a matter of prudence, to carry this out as far as Waterloo Bridge, as this is the part which affects the Houses of Parliament, but it will afford good data for other portions of the river. If I could have my way, I would go from Richmond to Blackwall. The expense would not be £100,000 the whole distance. There is no difficulty in determining the cause of the present deposit, and if the cause is evident so is the remedy. The success of my plan depends to a large extent upon the fact that gravel will not be washed away by the water. The holes which are now worked in the bottom and on the sides of the river are caused by the obstructions in the stream which create gullies. If it were found necessary to pave part of the sloping banks with stone it could be done, but I do not think it would be necessary, and therefore do not propose it. A concrete margin of lime might be used if required. It it turned out to be desirable, it would not be a very serious item. It would not cost more than 6d. a superficial yard of 6 inches deep. I think in some of the deep gullies it might be necessary to drive dwarf piles, but the cases would be very limited. I do not know of any other place than the front of the Speaker's residence. I do not think that any part of the foreshore need be pitched or paved. I have observed the effect of the Chelsea embankment. There the foreshore is very short, and there is no obstruction. When the channels which I propose to construct are made, I would confine the dredging operations, which are now carried on at all parts of the river, to certain portions only. I do not think that paving the banks wound render a less slope sufficient—I should be afraid to trust it. At Chelsea there is a sloping bank and deep water channels, which remain clean.

By the CHAIRMAN: I do not think the proposed inclination of 1 in 12 would be a serious inconvenience to the owners of wharves, but quite the contrary. Since I wrote my report I find that 19 feet of tide gives two inches of mud, and there is no deposit at neap tides. From examination I find that this mud consists of the *débris* of the streets. It exists in the river from Richmond to London Bridge, but dies out at Greenwich. [Witness produced specimens which had been taken above the Houses of Parliament, dried and pulverized; and, by the use of the magnet, showed the large amount of metallic substance contained in it.] The object of producing these specimens is to prove that the mud in the river comes from the streets, and that it is carried up the river in larger quantities than it is carried down.

The CHAIRMAN: Having carried out your plans, what would be the effect, as far as the purification of the Thames goes?

Mr. GURNEY: I think the sewerage would be got rid of. As the tide falls back from the inclined plane it would carry away all the impurities there. The sewerage would be conveyed in trapped sewers below low-water mark. At present the sewers are not trapped, and the sewerage comes out from the wharf walls. Before it goes in, I would deprive it of all its gaseous impurities. Sewerage may be described as solid, liquid, and soluble and æriform. The solid parts are washed into the river, the liquid parts become part of the water, and the gaseous parts come out and float in the atmosphere. I would take the sewerage down to low-water mark by channels which are air-tight. It is a most important part of the arrangement, and is essentially necessary for the purification of the atmosphere of this House, that the mouths of all the sewers should be trapped.

By the COMMITTEE: With regard to the gaseous and offensive effluvium, I would burn it, and not allow it to escape in its present form. It is a difficult thing to do, but when the sulphuretted hydrogen and sulphate of ammonia are destroyed, and the sewerage taken down to low water in trapped sewers, the offensive smell would be very moderate indeed. Much of the present annoyance is occasioned by the deposit of organic matters upon the banks and the escape of gaseous matters from the mouths of the sewers. We have 2300 tons of water running down the river every minute, and that is enough to carry away all the sewerage of London. The effect of the water upon the sewerage is to get rid of the annoyance by dilution. I propose to burn the gaseous matters in the way in which it is now done in this House. The gases as they rise are mixed with low-pressure steam, when they become instantly decomposed; the sulphur is burnt, and the smoke and ammoniacal gas are destroyed. We have made experiments, and find that the pull from the Clock Tower draws the gases from Buckingham Palace; and by experiments at Friar Street, there was a sensible pull at Blackfriars Bridge. I have not made any experiment to know how many tall chimneys would be necessary to draw the gases from the sewers of London. You would get as much power in a shaft of 50 or 60 feet, properly built, as from the Clock Tower; but I would carry them from 150 to 200 feet. A space of 30 feet square would give enough for two shafts. There would be no offensive effluvium in the operation itself. The upcast shaft might be at any part of the sewer. If the sewerage were thus dealt with, and the sewerage water put into the river, the small quantity of solid and liquid matter which would remain would not affect it, and the water would be quite as pure as when the London Bridge Water-Works were in existence. My opinion is that, even if the main-drainage scheme were carried out, it would still be necessary to burn the gases. I have never considered any plan of deodorization in connexion with my scheme, for I do not think it would be necessary or useful. This remark applies to the agricultural value of the material produced, and not as to the purification of the Thames. You can, of course, destroy stink. I have seen almost all the plans for draining London, and I think that, even if the intercepting sewers were carried far down the river, it would still be necessary to have these inclined planes, because the refuse would be, to a certain extent, brought back and deposited on the banks. Mr. L. Thompson has made experiments which show this to be the fact. I am certain that, do what you will—even if you go to Sea Reach, portions of sewerage will come back and be deposited, and you will have the same evils that you now have. My plan would require no Act of Parliament to carry it out, and would interfere with no vested interests.

The CHAIRMAN: Then, as far as this neighbourhood goes, all the result of the expenditure for intercepting sewers would be *nil*?

Witness: It would.

By the COMMITTEE: I believe I could get the uniformity of sectional area by dredging and depositing. I believe it is practicable to make the deep channels, and that they are as necessary for getting rid of the eddies as the slopes. The uniform width of the river at low water would be the same, as far as sectional area is concerned. It must be kept at the level at which we dig it to secure the down-cast. There is very little disturbance at the bottom of a running stream like the Thames. I would, if possible, carry these channels down to Greenwich at least.

The CHAIRMAN: In your report you say, "I find the specific gravity of insoluble sewerage to be 1·325; it will sink at the rate of about a foot per minute in still water or in slow currents. It will also precipitate in stronger currents moving in parallel lines; at a greater rate than 170 feet it will not precipitate, because in these currents the force of agitation, or rather convolution, is rather greater than the force of gravitation." Have you proved by experiments of your own that sewerage at a greater rate than 170 feet will not deposit?

Mr. *Gurney*: I can make an experiment before we come again.

After some conversation the room was ordered to be cleared, and the committee remained in consultation until the close of their sitting.

SECOND DAY.—MONDAY, JUNE 7.

Mr. *Gurney* said: During the last few days I have found, from inquiries which I have made, that the uniform opinion of wharfingers on both sides of the river is that by my plan the approaches to the wharves would be improved. I have also ascertained that those parts of the river on this side which were dredged for the foundation of this House twelve years ago, have remained in the same condition, and I can learn nothing in reference to the subject that would suggest a doubt of their continuance in that state. The same operation was carried on at Blackfriars Bridge, and there has been no disturbance by the tide. Last August I had about a ton of gravel deposited in the river at low-water mark, and it has not been removed.

The room was then cleared, and the committee were for some time in consultation. On the parties being readmitted, the following evidence was called:—

Mr. *John Downing*, who deposed that he was a lighterman and conversant with the wharfage of the river Thames. He was aware of the nature of Mr. Gurney's plan, and that it was proposed to make an inclined plane of 1 in 12 all along the foreshore from Vauxhall to Waterloo Bridge, and to dredge a channel on both sides 9 feet wide, 8 feet deep, and 150 yards from the wharf. He did not think that that would be any detriment to the traffic. The barges would not be injured by resting on the incline if it were kept free from mud, and Mr. Gurney was of opinion that he should not have any mud. The present inclination at his own wharf was more than 1 in 12, and the soil was a mixture of gravel and clay. There was a tendency to accumulate mud when the barges were not there, but the mud did not lay much. His wharf was situated at Millbank, and fell back at one end 30 feet from the common line of shore. It was about 200 feet in length. Whenever the mud deposited, it was cleared off by wooden rakes. At Trinity high-water mark he had about 5 feet of water, so that by this plan he would get an additional 3 feet. He thought that wharfingers, who now had more than that depth, would be content to have the bank raised, except those who had billyboys and sloops coming along shore; but there were very few of these above bridge. On the south side of the river it would be a great benefit, as at present they had but very little water at neap tides.

Mr. *W. Cory*, coal merchant, of Lambeth, deposed that he had wharf premises on the banks of the river, to which many barges came for the purpose of unloading coals. He was aware of the nature of Mr. Gurney's proposal, and believed that, if carried out, it would effect a great improvement of the banks. Eight feet of water would be quite sufficient to float any barge. At Trinity high water he had only six feet. Some few years ago he raised the foreshore of his wharf, so as to save labour in unloading barges. A portion of it was level, and the remainder an incline of a greater angle than 1 in 12, which always kept itself clear of mud. The bank was composed of old building material and gravel dredged out of the river. It was raised 10 years ago, and the water had had but very little effect upon it. The mud accumulated on the level portion but not on the slope, and it remained about the same in quantity as it was soon after the bank was made. At the outside of the made ground the bank was inclined at an angle of 40°.

Mr. *Robert Miller*, a barge maker, said he advocated what was proposed to be done by Mr. Gurney, though in a few instances it might create inconvenience by interfering with the shore by the wharves. It would do so in his own case, as the shore would be useless for the repair of barges, if there were eight feet of water at low tide. At present he had only four feet at the highest. At the same time, it would be a great advantage generally to have more water than now. Barges did not draw more than five feet, and billyboys would do well with eight. The greatest amount of mud was deposited at spring tides. His premises were directly opposite the Penitentiary, and he believed that when the piles driven into the river for building the new bridge were removed, his incline, which was a uniform one of 1 in 10, would be

kept clean, as it was before. The gravel was not affected by the water, nor washed to the foot of the inclination, nor did the moving of timber upon it move it from its place; indeed, the incline was more steep than formerly, from the fact of the gravel washing up. When there were a large number of barges on his wharf, the flow was obstructed, mud was deposited, and it became necessary at certain times of the tide to rake it. The main channel of the river ran near to the wharf, and he believed that had some effect in keeping the bank clear. If the plan now proposed were carried out, it would be necessary for him to have tidal docks, as he would not be able to repair barges on the ways. The raking of the mud did not involve much expense.

The CHAIRMAN, addressing Mr. Gurney, said the impression on the last witness's mind was that a uniform depth of eight feet would interfere with his operations, and that he must have more shallow water.

Mr. *Gurney* said that would not at all interfere with his plan, but he thought the witness had been speaking of high and not of low water. It would be desirable to have the water-way as uniform as possible, but he should not object to have a higher inclination, provided it did not create retrogrades.

The CHAIRMAN inquired whether the want of uniformity in the slopes would not cause deposits?

Mr. *Gurney* thought it might be arranged so as to accommodate the wharfingers as much as possible.

Mr. ROUPELL inquired whether occasional dredging would not be necessary to keep the channels clear?

Mr. *Gurney* said he thought not. A pit of 100 feet in length, which was dredged out for the Chelsea embankment, had never filled up.

Mr. *Thomas Holmes*, an old waterman connected with the ferry at Westminster, was called, and gave evidence to the effect that channels which had been dredged in the river for some years had not silted up.

Lewis Thompson, Esq., examined.

I am a medical man, and a member of the Royal College of Surgeons. I have devoted much time to the study of chemistry, especially that of animal and vegetable substances. I edited Dr. Ure's work on chemistry, and contributed a good deal to his last work, "The Dictionary of Arts." Many articles in that work were mine. I first saw Mr. Gurney's report on my return to this country in the month of April last, and the reading of it led me to make some experiments. I found that Mr. Gurney had developed what appeared to me to be quite a new idea on the question of sewerage; and, as I had previously examined all the reports upon that subject, and all the theories which have been put forth during the last eight or ten years, I was greatly struck by the circumstance that his should be so entirely different from all previous ones, and should, so to speak, contradict everything which we had been accustomed to believe in. It appeared to me that these contradictions, nevertheless, if true, accounted for a fact which had always puzzled me before, viz., that the lighter portion of sewerage continued to remain in the river, when upon every previous hypothesis it ought to have gone out of it. All former writers had come to the conclusion that sewerage swam upon the water, and under those circumstances it appeared singular that it did not float out of the river; whereas the fact was apparent that, though the water ran out, the sewerage remained. This seemed a paradox to me; but when I saw Mr. Gurney's pamphlet, in which he says it is heavier than water, I could understand its remaining in the river. At the same time, I thought it might, if heavier, be deposited on the bed of the river; but, on examing the question, I found that, though heavier than the fresh water, it was not heavier than sea-water, but held an intermediate gravity between the two, so that there was a bar to its descent below a certain point; and in this manner it was kept in suspension till, by the action of the tide meeting at so many points the down-flow, and producing a fight or conflict, the mud was raised up and carried still further up the river. This matter has been correctly stated by Mr. Gurney in his report, and it is not necessary to prove it. If a similar conflict could be made to take place at the ebb tide the sewerage would be carried back again; but this is not the case; and the consequence is that, carried up by the flood, it is precipitated on the banks. Mr. Gurney makes allusion in his report to the specific gravity of sewerage, and I have examined into the matter. I have here the result of a large series of experiments, showing the specific gravity of almost all the matters which find their way into the sewers. [Paper handed in.] Some of these matters are lighter than water, such as the grease which is formed from the decomposition of soap. There are about 18,000 tons of soap consumed in London per annum, from which 10,000 tons of grease are made to flow into the river, which forms a considerable item in the sewerage. The heavier portions are the iron from the horses' shoes and the wheels of carriages and the granite from the pavements. From experiments which I have made, I find that the specific gravity of the mud is almost exactly what Mr. Gurney has represented it to be. [Witness proceeded to show the correctness of his observations by means of an experiment. He produced an apparatus, consisting of an elongated glass tank, with a shelving bottom, at the lower end of which was a square chamber having means of communication at pleasure. The former was filled with Thames water, and was intended to represent the course of the river from the metropolis to its outlet at the Nore (the square chamber), which was filled with sea-water coloured pink. Along the whole length of the former a pipe was carried on the exterior to represent the proposed intercepting sewer, communicating with both vessels at the lower end. He then poured into the top of this pipe a blue fluid of the same specific gravity as sewerage, which on reaching the outfall, instead of mixing with the sea-water in the chamber, the bottom of which was lower than the tank, immediately commenced a retrograde movement, and passed up the shelving bottom of the tank, until its top water-line was level with the point of outfall. On removing a cork, and opening a communication between the tank and the chamber, the sea-water passed up the incline underneath the sewerage; and again, on filling the tank so that it overflowed into the chamber at the lower end, the river-water remained in a distinct body upon the surface of the sea-water.] The object of this experiment, he said, is to show the specific gravity of these fluids, and to prove that Mr. Gurney is right in his conclusions, that even if an intercepting sewer is carried down to Sea Reach, a large portion of the refuse there discharged will not go out into the ocean, but will be brought back again, and by the influence of the tides deposited on the banks of the river, if left as they now are. In fact, it proves that, under existing circumstances, there is no advantage whatever to be derived from sending the sewerage to Sea Reach, and that it might as well be discharged at London Bridge. The further you go down the river the more does the specific gravity of the water and the disposition to return the sewerage increase.

The CHAIRMAN: You do not mean to say that all the sewerage will return?

Witness: No; but that there is a disposition to return the lighter portions, which consist of organic matter, and which are the most offensive. No doubt the iron and the gravel will stay down there, but the floculent matter will be thrown back by such an arrangement, and that is just the portion which corrupts and putrefies. This experiment, in fact, is simply an illustration of what I have found in Mr. Gurney's pamphlet. I have endeavoured to satisfy my own mind as to every part of that pamphlet, so as if possible to come to a correct conclusion, and I believe I am justified in saying that I can safely approve of the whole. This simply relates to the lighter portions of the sewerage, and it proves, I think, that he is perfectly correct in his views. The only circumstance which would appear to justify the sending of it down to Sea Reach is the fact that the sea is not wholly composed of sea-water.

The CHAIRMAN: You are not connected with any sewerage plan?

Witness: No; but I am in the habit of examining every plan that is proposed. This experiment shows that the Sea Reach plan would answer very well if the sea were composed of river-water. I have paid attention to his plan for inclining the banks of the river. I am not practically acquainted with that part of the subject, but there are circumstances which satisfy me that his proposition is a correct one.

By the COMMITTEE: I have not gone into the question of the action of the tide. No doubt that would have the effect of mingling the whole together. I find from experiments, that the very bottom of the river contains sea-water or saline matter, though the upper portion is fresh, and the specific gravity of the two is very different. The influence of the sea sensibly affects the river as high as London Bridge, and at high tides it is more or less saline; so that it is heavier than the ordinary London sewerage, which is, therefore, kept upon the upper water mark, and is carried higher up the stream.

By Mr. ROUPELL: The great force of the action of the Thames is almost entirely upon the surface, the waves affecting the bulk of the water only a few feet deep. The waves produced by the steamboats, although apparently very strong, are unfelt at a depth of eight or ten feet. We have evidence of this in the fact that many of the minute sea vegetables, which are easily broken, grow at the bottom of the river at Sea Reach, and may be brought up uninjured by placing a piece of tallow upon the plummet. The inference is, that any increase in the current of the river would have no effect, but would expend itself upon the surface of the stream. The strata of sewerage and water would be mixed only on the edges of the stream where the motion is very great. The different strata advance up the river, not broadside on, but in the form of a cone, so that the salt water might be discovered higher up the river in the centre than at the banks. The upper surface of the sea-water would be perfectly plain there, and fill up all irregularities. We have reason to suppose that sea-water in large quantities does not assist in decomposing sewerage. I think, in respect of this locality, the presence of sea-water in the river has an offensive effect, and causes the organic matter to decompose. Down at Gravesend it would have the opposite tendency. It all depends upon the proportion of sea-water.

By Sir JOHN SHELLEY: I do not infer from these experiments that it is desirable to get the sewerage down to low water in all cases. The only inference I draw from it is this, that it is useless to send it out to Sea Reach, or anywhere else, unless you send it right to sea. I apprehend the result would be just the same as at present, even if discharged into the deepest part of the river, because the sea-water will not allow it to sink or settle, so that it keeps there constantly floating about. From other scientific data, I think it would be better always to extend the sewers to low-water mark, as, under such circumstances, the contents would find their way easier and sooner to the lower part of the bed of the river, where it is less exposed to atmospheric influences.

By Mr. CAYLEY: If poured into the river in any shape or form at Sea Reach, it would undoubtedly return; for, though discharged under the sea-water, it would immediately rise above it, and, having found its level, float up the river again with the returning tide. In fact, it would return if there were no tide, though the tide would greatly favour its progress. The upward force of the tide is much greater than the downward force, and the consequence is that it raises a disturbance which the other is unable to overcome. The upper current is produced mainly by the tide coming up, so that during the up-tide the current at the bottom would tend to create an agitation on the sides of the river, and produce obnoxious effluvia. The tide coming up acts chiefly on the sides, and has the effect of drawing the mud into the centre of the river, and sending it up a great distance. I have no doubt it is carried up as high as the tide reaches.

By Mr. PERCY: The Thames water is carried out on the surface of the sea for five or six miles, and the Mississippi is carried on the surface for fifty miles.

By Sir JOHN SHELLEY: Within the last twenty years, the sewerage discharged into the river has become much worse. In 1826 I should have had no objection to drink the river-water, but since the more general introduction of water-closets it has been getting worse every year. Some portions of the organic matter contained in sewerage are heavier than sea-water, but the quantity is exceedingly small. Of the proportion of animal matter taken in the food of the population of London, certainly not more than 12 to 15 per cent. is soluble. A scheme for the sewers of London should provide for their discharging at low-water mark. The objection I have to going to Sea Reach is the expense, and my conviction that you would be disappointed in the results. I see no means of getting rid of the sewerage of London except by Mr. Gurney's project. The force of the water gravitating down the river is exerted on the surface entirely, and therefore in no way interferes with the current, which may be flowing at a lower depth in an opposite direction, so that the sewerage may be returning when the tide is running down. At one period of the tide, just before it meets the fresh water, you will always find the sea-water running underneath the river-water. The upper portion of the water at London Bride is apparently pu[illegible] but there is a great deal of floculent matter in it. If it were bottled up for three weeks it would blow out the cork of the bottle, and a lighted match applied to it would cause it to take fire.

By Mr. PERCY: A little sea-water will promote decomposition. It is a well-known fact that butter is exceedingly liable to be decomposed. If put into a little salt water it will do so speedily, but if a great deal of salt is used it may be preserved for a length of time.

By Mr. ROUPELL: The water of the Thames is more dense as you approach the bottom. I was not aware that the bargemen drank the water collected on the surface. I know that a gentleman, who was a coke-burner on the Tyne, and had been in the habit of slacking his coke with the surface-water, in order to economize labour had a pump erected which drew the water from the bottom; but he was obliged to discontinue the use of it, as his coke became spotty through the saline matters in the water acting upon the sulphuret of iron which it contains.

By the CHAIRMAN: If the existing angles in the river remain the same, there is no advantage in extending the sewerage to Sea Reach.

The CHAIRMAN said this brought the inquiry to the large subject of sending the whole of the sewerage by close drains under low-water mark into the Thames, and there was not time at this sitting to go into that.

THURSDAY, JUNE 10.

Mr. *Scholey*, examined by the CHAIRMAN.

I am an engineer. I have given my attention particularly to dredging. I have employed men to dredge, and have worked at it myself. I have dredged in different parts of the river up as far as Putney. The object of the dredging was to take stuff for ballast and other purposes out of the river. The stuff is never taken up a second time from the same spot. Where a flow is created and a channel is cut through, I have never found it to fill up again. I have dredged from London Bridge to Blackfriars Bridge, and from Blackfriars Bridge again right away to Westminster Bridge. The places where a channel has been cut through have not filled up again.

By Mr. ROUPELL: The direction we dredge in is down generally. In our work we work for the purpose of getting gravel, and where the stuff becomes clay, or mud, or such like as would not be used for ballast, we leave it. We do not make holes in the bed of the river; in many places we have been obliged to stop holes.

By Alderman CUBITT: I dredge wherever I find good ballast, and when I have got all I can, or when the stuff turns out bad, I leave and look for another place mostly. If holes without a cutting between them are made, I find that the mud settles in them, but not in all places; but if a channel is cut through a series of these holes, there would be a current of water which would keep them all clear.

By Mr. CAYLEY: The dredging is carried on as far as the stuff answers. I have made one continuous excavation several hundred yards long. We do not find that it ever fills up where it has been cut through. I have known a channel so cut—a long continuous channel—remain without being filled up for many years. I have known one that has been cut for these 20 or 30 years, and in spite of this, I see no symptom of its filling up.

By Mr. LOCKE: I am 29 years of age, and have had to do with dredging, more or less, these 20 years. When I was nine years old, I used to go backwards and forwards to the dredging works, and overlook the men for my father.

By the CHAIRMAN: I have been working the principal part of my time, and have been kept to look over the men in my father's time. I have been dredging all my life, and my father before me. I have heard my father say that where there was a cutting and a continuous flow there never was a deposit. We set to work in this way: First of all, we pitch on a good piece of ground, and we continue working onwards, making a channel as we go; and if we happen to make a channel of any length, from my experience, we find that the channel does not fill.

Lewis Thompson, Esq., recalled, and examined by the CHAIRMAN.

The sewerage should pass into the river in a close tube at a point decidedly below low-water mark. I think it would be absolutely necessary to convey the sewerage in that way. I would send the whole of the sewerage into the river under low-water mark. I think that if sent into the river under low-water mark, the tendency to decomposition would be very much prevented, as the action of the air would be excluded. You may preserve animal matter almost any length of time by excluding the air; and therefore the sewerage in this case falling to the bottom of the river would be protected from the air. According to Mr. Gurney's scheme, the gaseous matter contained in the sewers would be enclosed, and drawn away into places where they would be carried off. It is a very important part of Mr. Gurney's plan to burn the gases by means of decomposing furnaces. I have given considerable attention to the subject, and have tested the gases before passing through his decomposing furnaces. I should not hesitate to breathe them after they had passed through the furnaces, but should be very sorry to do so before. I have tested them before and after they were subject to the action of the furnaces. I found that the gases or vapours from the sewers were, to say the least, of a very suspicious nature. I have collected water from the sewers at different times, and have found insect life develop itself in it. The water was perfectly alive with animalculæ, which were liable to be breathed by the lungs of any persons brought near the sewers. This water [exhibiting some in a bottle] was collected about three weeks ago, and at the moment when it was collected it was, to all appearance, perfectly pure. It has been merely kept in the bottle, and the result is the production of minute plants and animalculæ, which have the appearance of white moss. Here, also, is another specimen, to which a small portion of nitrate of silver was added, which gives it a slightly red colour. Those experiments convince me that the air of sewers contains organic matter of some kind. I find that the air, after passing through the furnaces, contains no organic matter. I should therefore not hesitate to breathe the air from a sewer after passing through the furnaces, although I should certainly be averse to do so otherwise. I find by my experiments that this water contains organic matter which leads it to decompose, and a sort of plant grows in it, and not only that, but small animals. I have examined the air after it passes through Mr. Gurney's furnaces, and I find that the organic matter is then entirely destroyed. One of the objections to ventilating the sewers with fire is, that you would require so high a temperature as to render the process very expensive. I feel satisfied, from my knowledge of mining, that the thing could be done at a moderate cost. Having been born near a pit's mouth, and educated near one, I have some theoretical knowledge of the mode of ventilating mines. Instead of passing the vapours from the sewers through the fire, Mr. Gurney would first submit them to the action of steam; and the more destructive effect of steam, even at a lower temperature, upon animal life, seems to have been previously noticed by the celebrated chemist Berzelius. [Witness read an extract from the works of this author in support of this opinion.] The matter which I examined would occasionally appear to contain animals; generally it would show vegetables; but the animals would appear only when subjected to a very high temperature.

By Mr. ROUPELL: There is no doubt that many forms of organic matter, of which, in chemistry, we have no knowledge, tend to produce the disagreeable effects experienced from a drain; but as to the mode of action, the subject has been so little examined that it is impossible to speak positively. There is something floating in the air quite different from inorganic matter. It is difficult to distinguish occasionally between fungi and animal matter; but animal life for the most part exists much longer. In examining mildew, it evidently consists of fungi and also of animalculæ. The principal point in Mr. Gurney's system is, that it subjects the foul air to steam before it passes from the furnaces, and that, in my opinion, is decidedly more effectual than by subjecting it to fire alone. In the event of a few traps being dislodged or becoming defective, that would, to a certain extent, diminish the effect of the shaft—still the House would not draw the air out of the sewer. It would be only necessary to give the maximum amount of draft to the chimneys to prevent the bad effect.

By Mr. TITE: The existence of animal life in the dust of our cities is well known. Mr. Gurney's plan is for moistening the air before sending it into the furnaces. I have frequently discovered animal life myself in the matter contained in sewers. So far as physiology is concerned, we are quite in the dark as to whether the morbific tendency proceeds from animal or vegetable life.

By Mr. AKROYD: I would not recommend the air after being burned for breathing, but I would not like it at all before being burned. The floating animalculæ are heavier than the air generally, and therefore, when you get to a certain height, you get none of those animalculæ. If, then, the air inhaled in the House of Commons were admitted from chimneys raised 100 feet above the Houses of Parliament, it would be a decided improvement on the present ventilation, even though the Thames remained in its present polluted state.

By Mr. CAYLEY: In that case the windows should certainly be closed. I have frequently analyzed the air of the Parliament Houses, and have paid a great deal of attention to it. The lower stratum of the air near the river—on the terrace, for instance—is always defective except in the winter time. The sewerage cannot escape into the Thames during a considerable part of the day, during high-tide, unless it happens to enter at a higher level. Mr. Gurney's scheme would destroy all the poisonous matters generated in the sewers, but not that generated in the river. The sewerage at present rests in a considerable degree on the sides of the river. The reason it remains in the river is because the down current cannot touch it. I think I have explained the reason why the process of decomposition does not go on while the mud is covered with water. If Mr. Gurney's plan did not remove the mud from the sides, the good effect would not be produced. Water is a tolerably good deodorizer.

By Mr. LOCKE: So long as the sewerage is contained in the water there is no great danger of noxious influences; it is not so objectionable while in the water as if decomposed. If I could burn the gases coming out of the sewers, leaving the solid matter to be carried into the sea, I should get rid of both portions. With respect to the volatile matter, it is not to be passed through the fire but over it. The plan of ventilating a mine and ventilating the sewers would be something similar. Mr. Gurney proposed to trap all the apertures. I have placed a funnel over a portion of the mud of the river, and examined the air contained in it after the lapse of 24 hours. I found it contained a portion of carbonic acid and hydrogen. I have here test papers which have been exposed to the action of the air and of the mud. The black one was exposed to the action of the vapours from the mud; it was hung in the air over the mud, not put into it. Here is also another paper, not so much discoloured, which was exposed to the air over the river for six hours. It was suspended partly over the mud and partly over the water. The air arising from the river or from the mud does undoubtedly contain sulphuretted hydrogen. There is not the least doubt of it. I have never tried the experiment of the paper over the water alone. I have never suspended it in such a situation that the mud did not act upon it. In order to test by the water alone, it would be necessary to take the water and enclose it in a vessel, and suspend the paper over it. If I hung the paper in the central arch from one of the bridges, I think it would be discoloured by the sulphuretted hydrogen floating from the mud on either side of the river. What I foresee in respect of this project altogether is that, if it did not remove all the noxious matter, it would certainly remove 99 per cent. of it. I attribute the contamination from the Thames to the mud rather than to the water. I should think to remove the mud would be doing away with a very small portion only of the great evil—perhaps about one-third. The decomposing of the air in the sewers is the principal point. Even if the other portion of the scheme was abandoned, I should strongly recommend the decomposing of the gases in the sewers. I have not thought much about the number of fires that would be necessary to carry into effect the system completely, but I should think twelve would be sufficient. I would make them powerful enough to do it. It would make very little difference whether or not the furnaces were placed at the points of discharge.

By Lord JOHN MANNERS: I do not attribute any portion of the effect produced on the papers I have exhibited to the action of smoke. However, it is possible that the action of some of the factories might vitiate the atmosphere. The air in this House contains sulphuretted hydrogen, most decidedly. However, it contains another ingredient still more injurious; it contains sulphuret of ammonia undoubtedly.

By Mr. CAYLEY: I have found the air in the library better than the air in the lower parts of this House. I have not examined the air in the libraries below stairs. Two-thirds of the noxious matter that at present enters the Thames might be destroyed by fire. The experiment is being actually tried at this moment. A large portion of the sewerage air of Westminster is brought to this House and destroyed there, and it is upon those experiments that I have spoken.

By the CHAIRMAN: I have never examined the air at the top of the clock tower, but I should be very happy to do so.

By Mr. CAYLEY: When a steam-boat goes down the river in July the centre is very offensive. A noxious effluvium arises from it, because the boat washes up the injurious matter and diffuses the vapour from it. [Witness here read extracts from Dr. Ure's works, showing the proportions of sulphuretted hydrogen which would prove injurious to animals of various kinds, such as rabbits, goldfinches, horses, &c.]

By the CHAIRMAN: I have made many analyses of the mud in the Thames, and the results do not differ much from each other. The constituents of the mud taken at any point between Vauxhall and Greenwich are very much the same. I have made experiments in the House of Commons, and I find that the proportion of oxygen in the air in different parts of it varies a good deal. There is a deficiency of oxygen in the lower parts of the House; in the upper parts the air is of the normal standard. The air which I examined was taken mostly from three o'clock in the afternoon till late in the evening. I have not had an opportunity of taking it in the House of Lords during the time of its sitting.

By Mr. TITE: I have had great experience in the manufacture of coal gas. That gas ought to be so pure as not to blacken sugar of lead paper, however long it might be exposed to it.

By Mr. AKROYD: The experiments on the air in the libraries were made between three o'clock and seven in the afternoon. I have compared the air in the House of Commons with the air in different parts of London—Hyde Park, for instance—and I have not found the air in Hyde Park very different from the air in the libraries of the House.

Alexander Gordon, Esq., C.E., examined by the CHAIRMAN.

I have resided in London for thirty years, and live upon the banks of the Thames at Whitehall. I know Mr. Gurney's theory. I have read his report to this House. I think his plan would be successful, and I intimated that opinion to Mr. Gurney before I have known cases somewhat analogous in the Dee and in the Clyde; and I feel satisfied that, if you once create a flow by dredging, the depth of the channel will remain the same. If deep water was created by dredging, and if gravel was placed on the banks so as to have a fall, it would not be expensive to keep the whole in order. At the incline that Mr. Gurney proposes the banks would not be easily disturbed. Perhaps the severest action of the water of the Thames is in the neighbourhood of Kew, where the large waves made by steamers in passing produce a very great action. The expense of dredging in the Thames is between 15d. and 18d. per cube yard. I have never dredged, but I have seen a great deal of it done. I have not gone into the question of estimate, and therefore any

answer I may give I hope the honourable committee will receive as an approximation only. If the work is done by contract I think it may cost about 18d. a yard. If done by order of this House, and the dredging machines, punts, barges, and other appliances be bought, it can be done at a cheaper rate; but then there will be the question what to do with the apparatus when you have done with the works? I think the two channels, from Vauxhall Bridge to Hungerford Bridge, would cost about £18,000. With four machines the dredging could be done. If a certain limit of time were fixed, that would increase the expense, as more capital would be brought to bear. I have not seen any part of the bottom of the river which was not sand, gravel, and clay. There is scarcely any part of it which would require to be blasted. The Thames was very clear thirty years ago. I have been engaged in the manufacture and sale of dredging machinery.

By Mr. ROUPELL: No great difficulty would be felt in getting rid of the shoals by the rake, but I am not prepared to say what the expense would be. I cannot say that an annual use of it would be required.

By Mr. TITE: The estimate of £18,000 was at the rate of 18d. per cube yard. The material got by the dredging would be taken to the sides as gravel. The dredging might be done in the first instance, the stuff put into barrels, and then spread out in the way that Mr. Gurney requires, for that sum of 18d. per cube yard. In point of fact, to excavate two such channels would cost so much money—£18,000 at 18d. per yard—but you would get the material spread as well as the dredging done for that sum.

By Mr. LOCKE: That estimate included also the forming of the slopes. It did not include walls at the upper surface of the slopes. I do not know that any portion would require walls. If once formed, there would be, in my opinion, no danger of the tidal water covering with mud either the surface of the slopes or the bed of the channel. I would not disturb the slope where it approached what was required, but would cover it with gravel. The slopes from London Bridge to Vauxhall must vary from about 1 in 18 to 1 in 10; I think Mr. Gurney talks of 1 in 10. Between Westminster and Hungerford there are two portions of mud and two courses of gravel, and the gravel is sometimes in such a state that people can walk upon it without soiling their Sunday clothes. In some places the mud is a mere film, in other places it is about 2½ feet thick, where there is little or no slope; the barges there sink a foot or two into it, and a little below they do not sink, and the carts go alongside to take away the cargoes from the barges. There is sand in the immediate neighbourhood of my house at Whitehall. Mr. Gurney's excavations are under low-water mark. With the exception of just taking off the inequalities of the surface so as to make the slope of one incline, there would be no occasion to take away any part of the surface, and what would be left would be composed partly of mud, partly of clay, and partly of gravel. I would make it all a gravel surface from end to end, and if it were so formed it would be so maintained without damage by the flow of the tide.

By Lord JOHN MANNERS: I was acquainted with the Clyde embankments after they were erected. Those embankments were paved sloping walls, and did not contain any mud upon their surface when I was acquainted with them, because the action of the current was sufficient to keep the surface clean. The slopes covered with gravel which Mr. Gurney proposes would not support traffic going along, but would support carts going in to take away cargoes from the barges. In the event of its being thought desirable to carry into execution the Thames embankment scheme, the slopes would not be able to carry the traffic on the top without a sinking of the foundations.

By Mr. LOCKE: Supposing the slope to be 1 in 12 in one case, and 1 in 10 in another, that would be a catch for mud if the incline was sharp; it should be sloped very gently. I do not say that there is any analogy between the Clyde works and the works now contemplated. The walls of the Clyde were made to strengthen the banks of the river; the scour is considerable; the tide now ebbs much slower and flows much higher, but that is owing to the narrowing of the channel. It is not an exactly analogous case to what is now under consideration with respect to the Thames.

By Lord JOHN MANNERS: The grand feature of Mr. Gurney's scheme appears to me to be that he gets rid of the mud altogether by preventing its settling: a walled embankment would not present the same advantage. Wherever you have an embankment there must be inlets, and in those inlets mud would accumulate unless steps were taken from time to time to remove it. With the exception of those inlets I am not of opinion that the mud would accumulate near the embankment. An accumulation would probably take place at the foot of the walls unless there were added to them an inclined gravel slope such as Mr. Gurney suggested. There is shingle at the side of the Chelsea embankment—how it came there I know not—and in consequence of that shingle the embankment will remain much the same for twenty years. If there was an embankment there would still be required a flow of water to be kept up more rapidly, such as would be produced by Mr. Gurney's plan. The certain effect of the embankment would be to deepen the channel. If you encroach upon the Thames the scour will become more rapid, and, even if the embankment were made, I think it very likely that the plan of Mr. Gurney would be required.

By the CHAIRMAN: Wherever you have quiet water, you must have mud collected. If the embankment were carried out you would have a wall, and there there would be no deposit, but the deposit would be where the barges were to lie.

By Mr. ROUPELL: If the embankment were made without Mr. Gurney's plan, the mud would have a tendency to lodge at the angle close by the side of the embankment, while at the centre of the river, where the current was strong, the mud would not be likely to be deposited. There would be a tendency to have the mud collected at each side, just at the angle of the embankment. Mr. Gurney's slopes, in addition to the embankment, would be the best scheme for the embankment of the Thames.

By Mr. TITE: Supposing the Thames enclosed by two parallel lines, in some places where the barges lie there should be openings, and in those positions the slope of the bottom should not prevent the evil, because there you would have got quiet water. The cost of the West India Docks, St. Catherine's Docks, and the Victoria Docks, in clearing away the mud, is enormous. If the Thames were embanked in the way that is suggested, the evil would continue in those quiet waters.

By Mr. ROUPELL: Horse labour could be employed in unloading traffic with great advantage without injuring the slopes, unless there were very great traffic. Such a slope as 1 in 12 would be amply sufficient to support any carriage-road; but the road-maker should see to the foundations. The slopes would not interfere with the construction of any embankment on the higher part of it, but I do not know that they would give any facility for it. So far as making a carriage-road on the top, I should not like to trust much to getting strength from the slopes; they would not, however, offer any obstruction to the carrying out any embankment scheme.

Mr. *Gurney* was recalled for the purpose of explaining a fact which he had alluded to in his evidence, with regard to the extra quantity of mud deposited at spring tides. He produced two bottles containing specimens, the one of the deposits taken from high water to low water, and the other taken from low water to high water. He said it was rather an important fact that about nine times as much deposit was made when the tide was at the ebb as at the flow. The mud in the bottles was taken from the bottom of the river, at about ten or twelve yards from the edges.

The committee then adjourned to Monday, the 21st inst.

THE STATE OF THE THAMES.

HOUSE OF COMMONS, FRIDAY, JUNE 18.

Mr. MANGLES rose to put a question to the Chief Commissioner of Works on the present pestilential condition of the Thames. Some time ago, when he asked a question upon the same subject, the noble lord referred him to the august body known by the name of the Metropolitan Board of Works, stating that the river Thames was under their control. When that body first commenced its labours, he used to read the published reports of its proceedings in order to ascertain how it was getting on; but its conduct was so futile and miserable that after a short time he ceased to take any notice of its doings, and the public press also had long ago left it to its own devices. He had been told that the only plan before the board at the present moment for abating the dreadful nuisance which was oppressing not only the members of both Houses of Parliament, but the whole community on the banks of the Thames, was one for delivering the entire sewerage of London into the middle of the river instead of at its side. (A laugh.) The board had been holding a meeting that very day, and he observed from the programme of business that Mr. Wright was to "draw attention to the present polluted state of the Thames, and to move that the board shall, on the day to be agreed on, inspect the river in a steamboat to be hired for the purpose." (Laughter.) Such was the advanced stage at which the board had arrived. He hoped that on the occasion of its patrol of the river the board would provide itself with a sufficient supply of brandy and other cordials to obviate the otherwise inevitable consequences of a sail on the Thames. (A laugh.) An honourable member had told him that he went down the other day to see the *Leviathan*, and on his return was obliged to stop half way and take a large dose of the stimulating alcohol to which he had just referred. (A laugh.) The matter, however, was beyond a joke. Parliament had committed a great mistake in handing the Thames over to any municipal body; but he hoped that, having at last found out its error, it would not hesitate to correct it at once. (Hear, hear.) London was the wealthiest and most populous city in the world, and yet its inhabitants had not the means of relieving themselves from the pollution of their own filth. (Laughter.) If cholera were to visit the metropolis while the river was in its present state, the mortality would be something dreadful, and a great responsibility would rest upon the Legislature. (Hear, hear.) Every one would remember the remarkable chapter in Lord Macaulay's "History of England," which described the state of England in the reign of Charles II., but that which struck us as most wonderful and strange—the unpaved streets, for example, infested by highwaymen—would be as nothing to the astonishing fact for our descendants that we so long submitted to this dreadful nuisance. Parliament had handed over the whole matter to the Metropolitan Board of Works, and nothing was done. When he was a young man, he remembered Thames salmon were celebrated. The salmon, wiser than members of Parliament, had avoided the pollution, and he was informed that cart-loads of fish were taken out of the Thames which had died in consequence of the state of the river. A noble mansion was prepared for the right honourable gentleman who occupied the chair, but could any honourable gentleman expect the Speaker to live in an atmosphere into which they would not put their worst enemy? They had built on the banks of the Thames a most magnificent palace for the Legislature, but how could they direct the attention of any foreigner to it, when he would be welcomed by a stench which was overpowering? God had given to them a most magnificent river, and they had turned it into the vilest of sewers. The country could provide £320,000,000 for railways, but £1,000,000 or £2,000,000 could not be applied to diminish this great evil. (Hear, hear.) He begged to ask the Chief Commissioner of Works what steps he had taken, or proposed to take, to preserve members of this and the other House of Parliament from breathing air infected by the pollution of the Thames?

Mr. Alderman CUBITT begged permission to vindicate the Board of Works, of which he was a member, as far as he could from the aspersions which had been cast upon it. The fault was with Parliament. (Hear, hear.) Parliament invented a scheme which was not practicable, and appointed the Board of Works to carry it out. (A laugh.) The board were directed to carry the sewerage below the metropolitan district, and they set about the work by calling upon engineers to produce a plan, which, if the scheme were good, was a good plan. They sent it up to the Chief Commissioner of Works, whose duty it was to say whether it was a proper scheme. He naturally shrunk from the responsibility, and called in professional aid. They said the sewerage would come back into the river, and the Chief Commissioner sent the plan back. The engineers of the board produced another plan, which carried the sewerage lower down the river. The Chief Commissioner was in the same "fix"—either to put a veto on it, or take the responsibility of it. He very wisely called in three engineers who had never had anything to do with the matter, and said to them, "Advise me whether this is a proper thing to do." They looked into it and said, "The metropolis will in a few years be three times as large as it is now, and you ought to provide for the future." The engineers of the Chief Commissioner prepared a plan, and it was sent to the Board of Works. The board, besides ordering the work to be done, had to find the money to do it. The estimate for the plan sent to them was between £5,000,000 and £6,000,000, and those who were called upon to advise the board said, "It is a monstrous plan, and will cost twice as much as the estimate." (Hear, hear.) The board had to consider whether they ought to spend £10,000,000 or £11,000,000, to be raised by a rate over the metropolitan district, and, besides that, many persons doubted whether the scheme was a proper one. (Hear, hear.) He confessed he very much doubted the propriety of returning the 80,000,000 gallons of water which they received daily from the Thames west of London, at a point 30 miles distant. (Hear, hear.) They had provided a daily supply of 32 gallons of water for every man, woman, and child, and by that means there was in London a perfectly healthy internal system; but the question was whether in hot, dry summer weather they could take out that bulk of water without affecting the supply if it were returned at so distant a point. He had been on the Thames for the last three or four days, and he entirely agreed in everything which had been said as to the vile state of that magnificent river. (Hear, hear.) Something must be done. (Hear, hear.) If the Board of Works had been appointed to consider what was to be done, they might be charged with neglect of duty; but Parliament did not charge them with that duty. They said, "Make a great sewer, and take the sewerage away;" and there was a dispute whether they proposed to carry it far enough or not. Within the last few weeks a committee had been appointed to hear the scheme of Mr. Goldsworthy Gurney. He was a member of the committee, and he took upon himself to

say that it would be a very valuable auxiliary to any scheme which could be proposed. (Hear, hear.) But it would not do alone. There must be some means by which the water could be returned into the Thames almost as pure as when it was taken out, and it was his decided opinion that it would not do to send the water away thirty miles from London. (Hear, hear.) He had no doubt that it was possible to devise some scheme which would be satisfactory. (Hear.)

Mr. WARREN, who had a notice on the paper to call the attention of the House to the inability of the Metropolitan Board of Works in respect of preventing the sewerage of the metropolis from flowing or passing into the river Thames in or near to the metropolis, said the Act by which the Metropolitan Board of Works was constituted came into operation on the 1st of January, 1856, and by its provisions the whole system of sewerage was to be completed by the 31st of December, 1860, yet on the 18th of June, 1858, nothing whatever had been done. The mistake was in applying local machinery to a national object. He wished to know whether the Government were prepared to take immediate steps to remedy this evil, and whether they would reconsider the Act in question?

Lord J. MANNERS said the First Commissioner of Works, as he had said before, had no power over the drainage of the river, except vetoing the proposal of the Metropolitan Board. The honourable gentleman asked whether he had done or was prepared to do anything to preserve the health of members from the noxious effects of the effluvia from the river? In answer to that question he would read to the House a report which he had that day received from Mr. Gurney. It was as follows:—

Houses of Parliament, June 17.

Sir,—I do not lose a moment in answering your letter, received last evening, requesting me to report to the First Commissioner what is already being done to improve the condition of the river Thames in the neighbourhood of the two Houses of Parliament, and also what, if anything, I propose to do in the matter within my jurisdiction.

With regard to the river itself there is nothing done, nor can I do anything. Before the meeting of Parliament, and during the recess, the mud outside the terrace was removed; but during the sitting of the House, and while the river is in its present state, the accumulation cannot be moved.

In answer to your latter question, I beg to say the means by which I propose to relieve the river (according to my report to the First Commissioner, printed by the order of the House, 12th December last, sessional paper No. 21) is now under consideration of a committee of the House of Commons.

I think it right to state, for his lordship's information, that the air entering directly the House of Peers and Commons through the proper ventilating channels is purified from the river effluvia by the spray jets.

For the purification of the air coming in through the windows of the House of Lords and Commons, should either be opened, I have placed canvass moistened with a weak solution of chloride of zinc and lime. The same is being fixed at all the windows likely to be opened towards the river, in the libraries and committee-rooms.

I have the honour to be your obedient servant,

GOLDSWORTHY GURNEY.

In addition to this, acting upon the recommendation of the noble lord, the member for Tiverton, of which he (Lord J. Manners) entirely approved, Mr. Gurney had been at work all day in distributing throughout the Thames, in the vicinity of the Houses, four or five barge-loads of lime—(a laugh)—and in spreading lime over the mud banks of the shores. Those were the simple measures which had up to that time been adopted, and he was really not aware at the present moment what more could be done. He was bound to say that, in his opinion, the provisions of the Metropolis Local Management Act, so far as they referred to the drainage of the Thames, and to the veto which they gave to the First Commissioner of Works, were not satisfactory. (Hear, hear.) The House had been engaged the whole of the session in endeavouring to meet the evils that were supposed to flow from a double government and a divided responsibility; but under the provisions of that Act there were a double government and a divided responsibility of a most hopeless and inconvenient character. They called together a body of gentlemen elected by the popular voice; they tied them down by stringent words in an Act of Parliament to do a certain thing in a certain way; and they declared that none of the plans which might be approved by that popularly elected board should be carried into effect until they had received the sanction of the First Commissioner of Works. But there was no provision requiring the First Commissioner of Works to inform himself upon the subject, and he might strictly perform every obligation that was thrown upon him by never leaving his room, and simply refusing his sanction to everything that was proposed. (Hear.) He would not enter into a discussion of that Act, however. The Metropolitan Board had from time to time submitted such plans as they thought fit; but the right honourable gentleman opposite, in the exercise of his discretion, had rejected those plans. He understood that a new plan had recently been submitted to the board, which had been prepared by able engineers, but it had not yet come under his cognizance, and he was unable therefore to express any opinion upon it. He thought that some change should be made in the relations between the Board of Works and the Government. Of course the difficulty in the way was, that if the Government took upon itself to drain the Thames at an enormous expense they could not in justice ask the metropolis to pay for it. On the other hand, if the expense of carrying out the works were thrown upon the metropolis, the board ought to be allowed to carry them out in their own way. The responsibility ought to be placed absolutely either upon one or the other. (Hear, hear.)

Mr. S. WORTLEY said that, until the relations of the Metropolitan Board with the Government should be placed on a more satisfactory footing, and somebody be invested with more discretionary power and the means of carrying out such works as might be advisable, the question would remain in the same unsatisfactory state that it had been in for the last five years.

Sir B. HALL would briefly state to the House the exact course of events with respect to the main-drainage scheme. In 1855 he introduced a bill for the better local management of the metropolis. At the desire of the House, it was provided in that bill that, before any great work should be undertaken by the Metropolitan Board in reference to street improvements or to the main drainage, they should be laid before the First Commissioner for his approval, and the clause which defined the manner in which the main drainage should be carried out contained a provision to the effect that the drainage should not flow into the Thames at any spot in or near to the metropolis. Soon after the Metropolitan Board of Works were called into existence they presented to him a plan which had its outfall within the metropolitan area, and which, consequently, was contrary to the provisions of the statute. Of course it was his duty to reject that plan. Some months afterwards they presented another plan, which was also contrary to the statute, because the outfall was so near to the metropolis that all the filth of the sewerage would have flowed back into the metropolitan area. He therefore rejected that plan; and he thought that the fact of these two schemes being submitted to him showed the wisdom of the provision, that no large work should be executed without the sanction of the First Commissioner, because, but for that, a plan would have undoubtedly been carried out which was contrary to the intention of the Legislature and the spirit of the Act. He then put himself into communication with the Metropolitan Board, having previously requested the then First Lord of the Admiralty to let him have the assistance of Captain Burstall, who was probably better acquainted with the Thames than almost any other person. Captain Burstall made a report, pointing out where the outfall out to be, and some time afterwards—in December, 1856—the Metropolitan Board submitted to him a plan, which had its outfall at the point defined by Captain Burstall. It would, he thought, have been presumptuous in him—an unprofessional person—to take upon himself to decide at once upon that plan, and he therefore took the precaution of submitting it to three eminent engineers. Those gentlemen reported on it, and at the same time they presented to him another plan. He gave no opinion upon it, but sent it at once to the Metropolitan Board, and said that he thought it might be worthy of their consideration. They referred it to their own engineer, in conjunction with Mr. Hawksley and Mr. Bidder, who submitted another plan to the Board of Works. Instead of communicating that plan to the noble lord who had succeeded him in the office of First Commissioner, they passed a resolution that they would defer all consideration of it until the month of October next. (A laugh.) That was the exact course of events down to the present time. The question now was, not as to the past, but what should they do for the future. The noble lord had stated very truly that if this work were to be undertaken by the Government the metropolis could hardly be expected to pay for it; while, on the other hand, that if it were to be paid for out of the local rates, it ought to be executed by the local authorities. He thought that the time had now come when the Government should consider whether it would not be better to take the whole of this great work into their own hands—(hear, hear)—whether they should not appoint some commission of able and responsible persons, subject, of course, to the approval of the Treasury, and leave it to them to carry out both the main drainage of the metropolis and the embankment of the Thames—works of such magnitude that it was impossible that they could be paid for out of local rates. (Hear.)

Sir J. SHELLEY was not a member of the Metropolitan Board of Works, but he thought that his honourable friend had been rather hard on that body. If he only knew the difficulties with which they had to contend as well as he knew Indian affairs, he would not throw so much blame upon them. It was not so easy as his honourable friend thought to decide how the Thames was to be purified. His honourable friend said that the House of Commons made a mistake in putting the matter into the hands of a board elected by the metropolitan ratepayers, but he (Sir J. Shelley) believed that the real mistake which the House made was that of rejecting the 141st clause of the Metropolitan Local Management Bill, which would have enabled the Treasury to advance money for the purification of the Thames, to be repaid by instalments with interest. The Metropolitan Board were now called upon to drain an area beyond their jurisdiction, but on the part of the ratepayers whom they represented they very properly refused to do so unless they were supplied with the necessary funds. The state of the Thames was, no doubt, infamous; but if the Government would furnish funds the Metropolitan Board of Works would purify the river. He protested against the whole expense of the work being thrown upon the present ratepayers. Like the cost of draining settled estates, the expense ought to be spread over a number of years. The sewerage of London was only one question with reference to the purification of the Thames. Until the Thames was embanked it would continue to emit the effluvia from which so many people were now suffering.

METROPOLITAN GAS SUPPLY.

THURSDAY, JUNE 17.

The Select Committee appointed to inquire into the supply of gas in the Metropolis met this day at twelve o'clock, and sat with closed doors until a quarter past one.

The committee consists of Mr. Mowbray, chairman, and Mr. Byng, Sir B. Hall, Sir J. Shelley, Mr. Roupell, Mr. John Locke, Sir W. Hayter, Mr. F. W. Russell, Mr. Thomas Mills, Mr. Jackson, Mr. Whitbread, Alderman Cubitt, Mr. Adams, Mr. Barrow, and Sir W. Dunbar.

All the members were present with the exception of Mr. Byng and Mr. Mills.

On the doors being opened, it was understood that the committee had decided on taking the case as affecting South London first.

Dr. *Challice* was called, and examined by Mr. LOCKE.

I am the officer of health for Bermondsey, and have held that position since the Metropolis Local Management Act came into operation. There are four gas companies supplying Southwark and Lambeth—the Phœnix, the London, the South Metropolitan, and the Surrey Consumers'.

The CHAIRMAN inquired whether any persons were present representing these companies?

Mr. LIVESEY responded for the South Metropolitan. Mr. SPRAGUE, of the London, and Mr. JOHNSON, of the Phœnix, were also present.

Examination resumed: I do not know the date of the establishment of the Phœnix Company; it is one of the old companies. Up to the year 1849 the Phœnix and the South Metropolitan Companies alone supplied Southwark; I do not think the London Company had come then. The price of gas was about 6s. or 7s. per 1000, and there were great complaints about the high charges. The Surrey Consumers' Company was established about that time. I am not sure as to the date, and am more prepared to speak as to what we have suffered since from the arrangements.

By Mr. RUSSELL: The Surrey Consumers' Company was established in consequence of the complaints at that time. There was a great agitation in Southwark, and Mr. Thwaites, the president of the Metropolitan Board of Works, took an active part in establishing it.

By Mr. LOCKE: After its establishment the price of gas was reduced to 4s., and there was great competition between the companies with reference both to the private and public lights. In 1853* an arrangement was entered into by the companies by which each one took a separate district and bound themselves not to supply gas to each other's customers. Soon after this arrangement took place, the price of gas was raised to 4s. 6d., and it was a general impression that this was the first fruits of the districting. That arrangement continues to the present time. In 1855 the companies applied to Parliament for a bill to legalize their arrangements, as far as I can understand it. I have not got a copy of that bill. It was read a second time in the House of Commons. In consequence of that application a society was formed in South London, including Lambeth, Southwark, and portions of Greenwich. I took the chair at the first public meeting held on the subject, at the Literary Institution in the Borough Road; and after that I was elected president of the society.

By Mr. BARROW: It was called "The South London Gas Consumers'

* Dr. Challice incorrectly assigned 1851 as the date when the arrangement between the South London Companies was made, and 1852 as the period when the advance in price took place. These errors are corrected in the report of his evidence.

Mutual Protection Society." (A laugh.) We tried to give it a shorter title, but could not. We came to various resolutions at different meetings, and we petitioned Parliament.

By Sir WILLIAM HAYTER: These are the minutes of our meetings, and the correspondence between us and the Phœnix Gas Company.

By Mr. LOCKE: We complained at that time of bad gas, and of an unequal and inefficient supply. We complained that, although the price had been reduced to 4s. 6d., we were paying more than when the price was 6s. per 1000; that we were made to pay for gas which had been consumed by former tenants; and that the gas was cut off on the slightest trivial dispute with the companies. We have evidence to prove that in one case, in consequence of a dispute about 1s. 6d., the gas was cut off on a Saturday night and the consumer left in darkness.

By the CHAIRMAN: That is part of my complaint, and we are prepared to give evidence in support of it.

By Mr. RUSSELL: That is a recent case.

By Mr. LOCKE: I have here an abstract of the minutes of our first meeting, on the 8th of March, 1855. There was a large attendance on the occasion. Mr. Thwaites and Mr. Pocock attended, and urged the meeting to allow the measure to pass with protecting clauses. The meeting adopted this resolution—"That this meeting is of opinion that the bill introduced by the gas companies into Parliament will be prejudicial to the interests of the consumers at large, and urges the committee appointed at the last meeting to oppose its progress in the House." Mr. Pocock was chairman of the Surrey Consumers' Company, and Mr. Thwaites was trustee to the Consumers'. The first public meeting was on the 26th of March, when Mr. Pellatt, Mr. Thwaites, and others connected with the gas companies attended, and a resolution which I have not got was carried by a considerable majority. [The resolution was to the effect that, in the opinion of the meeting, the bill should not pass unless clauses to protect the consumers were inserted in committee.] On the 26th of March this society was finally established, and on the 30th of April, at a public meeting held in Lambeth, Mr. Newman, a shareholder in the Surrey Consumers' Company, attended on behalf of the companies, and stated that the bill had been withdrawn. In 1856 a very large deputation from this society waited upon the Phœnix, the South Metropolitan, and the London companies to urge them to reduce.

By Mr. BARROW: The bill of 1855 was withdrawn; it was never passed.

By Mr. LOCKE: The interview with the Phœnix Company was held at their office at Bankside. We saw Mr. Johnson, the chairman of the company, who is also chairman of the Surrey Sessions, and a large number of the directors. Mr. Pellatt, who was one of the directors, was also present. On that occasion we told them, on the part of the consumers, of the various hardships of which they complained, in consequence of the monopoly that existed. We complained especially that, although the 6d. per 1000 did not appear a very great increase, yet that, in reality, the consumers were paying 40, 50, or 60 per cent. more for their gas than before the price was raised, and more particularly before the districting arrangements had taken place. I may state that that does not apply generally throughout, but specially to the district supplied by the Surrey Consumers' Company. Their district is principally one side of High Street, Southwark, and almost the whole of Bermondsey and Rotherhithe. It had been held out by the companies that one of the fruits of this districting would be great advantage to the consumers, and that they would be supplied cheaper by the saving of the companies in waste and by the regularity with which they could supply the gas. We complained that we had had no advantages, but many grievances; and we urged upon Mr. Johnson especially a reduction at once to the 4s., at which the gas was supplied previous to the districting. Mr. Johnson, on the part of the company, said that they were not in a condition to lower the price of gas to 4s., owing to the increased cost of materials and wages. He stated that, though prices had fallen considerably, still their shares were at a discount, and they were not in such a flourishing condition as to justify the course we recommended. In fact, we were put off. This went on until September, last year. I then thought it was time to remind them of their distinct promise given to us, that when they were in a more flourishing condition of affairs the consumers should begin to feel the benefit of this arrangement. [Witness read the correspondence which passed between himself and the company, and which appeared in the JOURNAL shortly afterwards.] Since then they have paid an increased dividend upon what they were paying before, and their shares have risen to a considerable premium, but we have not received any reduction.

By the CHAIRMAN: We do not know what rate of dividend they have paid, as they have added considerably to their works out of revenue; but we believe it is 6½ or 7 per cent. independently of that.

Sir WILLIAM HAYTER: Do you mean to have it taken down as part of your evidence—that they have applied moneys out of revenue to purposes of capital?

By Mr. LOCKE: I do not know anything except from their reports; and, speaking from them to the best of my recollection, they appear to me to have added to their capital from revenue in laying down increased works, and have likewise declared a dividend of 6 per cent. and upwards. It was a printed report.

By the CHAIRMAN: I have not got that report with me. I saw it, as it was brought to me; and it was also in a printed paper devoted to gas matters.

By Mr. JACKSON: That was in September, 1857.

By Mr. LOCKE: They have not reduced the price of gas; and, in consequence of their not doing so, we presented a petition to the House signed by 5000 consumers, in which we set forth the grievances we suffer under the districting arrangements, and pray for a committee of inquiry. There has been no remedy applied to the grievances we complained of in 1855, and those grievances have increased to a monstrous extent in the district supplied by the Surrey Consumers' Company. That company does not supply the district in which I reside, but I know the effect of the districting over the whole; and therefore I am not now speaking of it because I reside there, but because I know the complaints are more numerous against that company than any other. We had interviews with the London and South Metropolitan Companies, as well as the Phœnix. From the London Company we had a very melancholy account. They stated that there was no prospect of a reduction; that the company were in a bad state; that they had paid no dividends for a number of years, and saw no prospect of paying them. Therefore we had nothing to say to them; we could not ask them. I was not present at the interview with the South Metropolitan Company, but I believe the deputation were promised a reduction.

By Sir BENJAMIN HALL: The companies were then charging 4s. 6d., and they charge the same now. I believe there is an agreement that they should all charge the same.

By Mr. LOCKE: With respect to the Surrey Consumers' Company, we wrote to them, and they refused to receive us; they would not recognize us as an association, though they said they would receive any individual consumers. With reference to the grievances existing at the present time, we complain, in the first place, that a man is obliged to pay for gas, to a certain amount, whether he consumes that quantity or not; that a mechanic, if he wishes to have the gas, must pay either 30s. or £2 per annum. Thirty shillings is the minimum, and if he only burns 1000 feet of gas, he is charged the whole 30s.

By Sir WILLIAM HAYTER: He begins by paying 30s. as a deposit, and if he should afterwards remove to the other side of the street, and apply to another company to supply him, he is charged another 30s., although he may only have burned the gas for a week.

By the CHAIRMAN: No part of that deposit is returned.

By Mr. LOCKE: I could say much more on this particular head, but that is the fact. The next complaint is, that it is compulsory on a man entering premises where a sum of money is owing by a former tenant for gas, to pay up those arrears before he gets a supply of gas. We have a case in which a former tenant became bankrupt; the gas company refused to take the dividend under the bankruptcy, but made the new tenant pay the £20 which was due. He offered £16, but they insisted upon having the £20.

By the CHAIRMAN: I state that as a fact reported to me, and I am prepared to call a witness. It was related by me at a public meeting before the chairman of that particular company (the Surrey Consumers' Company).

The CHAIRMAN: I think it desirable if there are witnesses to these facts they should be called; for, though the chairman of the company was present at the meeting, he might not think it necessary to contradict the statement, and his silence must not be construed into an admission.

By Mr. LOCKE: This was one of our grounds of complaint It was not stated to the chairman and other directors of the company at our interview. We complain also that the gas is cut off on occasion of very trivial disputes. The next grievance is the registration of the meters—the great increase of registration. In a public building, where the gas is burned with the same number of burners for exactly the same period of time, the gas has risen within the last two years 30 and 40 per cent on the amount previously charged. That has been the case with the Bermondsey Workhouse, and we have a guardian here who will prove it.

The CHAIRMAN: What do you mean by the term, "registration of meters?"

Witness: I mean that the meters have registered an amount of gas so much larger than previously without more gas apparently being consumed.

Sir BENJAMIN HALL: Is this what you mean to convey—that in the former periods and the later periods to which you allude, you have reason to believe that the gas was burned for the same number of hours, but in the latter period the charge made for that gas is much more than in the antecedent period, the number of hours of consumption being the same, and, according to your impression, the quantity of gas consumed being the same?

Witness: Yes, exactly.

By Mr. RUSSELL: The circumstances having been similar. I have mentioned a public building because there is an amount of certainty about that. They might say with a private consumer, "You burn more extravagantly." There is Bermondsey Church, where the charge was £75 instead of £45. I am not quite certain as to the figures, but it was a considerable increase.

By Mr. LOCKE: I have observed it myself in private houses, and we might have 500 witnesses to prove it.

By the CHAIRMAN: I burn the South Metropolitan Company's gas in my own house, and I have no fault to find with the gas or with the company.

By Sir JOHN SHELLEY: I mean by that, as regards my own consumption.

By Mr. LOCKE: And with respect to the meters of that company registering more, I am not aware of any fact. The circumstance is not so frequent with that company as any other. In addition to the complaint of increased consumption, it is a fact that there has been less light. My bill of indictment is nearly at a close; I do not know that I have any other evidence.

By Mr. WHITBREAD: There will be evidence to prove all these.

By Mr. LOCKE: With regard to the charge made for gas consumed by previous parties, I believe it refers almost exclusively to the Surrey Consumers' Company. With regard to cutting off the gas, there are several cases applying to the Phœnix. There is no comparison between the illuminating power of the gas supplied now and some months since. It has been better lately, since this agitation has grown to its present height. The gas is now remarkably good; there is no complaint. It has been so during the last two or three months. There is a person, I believe, appointed in all the companies on the south side of London to test the quality of the gas. I do not know by whom he is appointed, whether by the companies or any public body, nor whether there is a separate one for each company. My impression is, that there is. The gas is tested at the works. I see an objection to that mode, and the reason of it is manifest. We have certificates that the illuminating power of the gas is beyond the parliamentary standard, and at the same time it is a matter of notoriety that the gas consumed is of very deficient illuminating power. Therefore, we do not believe the gas tested is the same as the gas supplied to the consumers. I think there should be a separate place for testing it independent of the works—that is to say, at the point of supply. I have known cases of a refusal to supply a person with gas, and there is a witness here to prove that he is refused unless he pays a former score.

Mr. LOCKE: Have you any suggestion to make with regard to the regulation of the price of gas?

Witness: I have rather an objection to a maximum price. I cannot help thinking that there might be a sliding scale according to the price of the raw material, and regulated also in accordance with the dividend.

Mr. LOCKE: What would you suggest that should be?

Witness: It appears to me it might be regulated according to the cost of coal, iron, labour, and the prices of the products, which seem to be an important element in the manufacture.

The CHAIRMAN: Have you worked it out?

Witness: No, I have not. I am not prepared to give evidence upon that.

By Mr. LOCKE: I know that very constantly disputes have arisen between the companies and the consumers, and the mode adopted by the former is to cut off the gas unless their views are complied with. I have a suggestion to make with respect to the way of treating cases of that description. I cannot help thinking that there should be a referee—some person to whom such dispute should be referred. It is an important power that of cutting off the gas, and leaving a business man without a supply for two or three days. There is a person at Rotherhithe now burning oil and naphtha, in consequence of a dispute with the company. The public lamps at Rotherhithe were lighted with naphtha; the vestry would not burn the gas any longer in consequence of a dispute between them. As to the proper person to settle such disputes, I would leave it to the wisdom of Parliament to

decide. I cannot suggest a proper person. I am certain it would be advantageous to have persons appointed by the vestries, or some body independent of the companies, to inspect the meters, in the same way that persons are now appointed to test the illuminating power of the gas. My reason for saying so is this: it is a question of measure, and when a person buys an article by weight or measure, and is shown a measure which he does not understand, it certainly seems right that he should have some power of control and means of proving whether it is correct. I think there should be an inspector of meters in the same way that there is of weights and measures.

By Sir W. HAYTER: I think the Phœnix and the Surrey Consumers' Company are established under Acts of Parliament. I do not know whether the others are, but believe so. I have seen the Acts relating to the Phœnix and Surrey Consumers', and have read them carefully. I do not think that any of the clauses in those Acts affect the question of which we complain. I do not know whether they are confined to districts, but we have an impression that the Phœnix has entered into an engagement which compels them to supply us with gas. I do not know whether the fault, therefore, rests with our association for not applying the remedy. It was complained of by some of the consumers who were handed over by the Phœnix to the Surrey Consumers' Company; and it is a question whether, by a suit in Chancery, they might not compel the Phœnix still to supply them, but nothing has been done. I am not prepared to say, with reference to the four companies, which of them are confined by Act of Parliament to certain districts. I do not know that I ought to have made myself acquainted with the subject. I have taken a great deal of pains perhaps unnecessarily.

Sir W. HAYTER: You come here to complain that these companies are supplying districts exclusively: now, if their Acts of Parliament compel them thus to supply, should you not rather complain of the Acts than of the companies?

Witness: We are not certain.

Sir W. HAYTER: Should you not have looked at the Acts?

Witness: I have looked at the Acts; but, like many others, they are doubtful. I believe that the present arrangement is illegal. I do not know whether the Phœnix and the Surrey Consumers' are confined to any districts by their Acts. I know they are not confined to the districts they now supply.

Sir W. HAYTER: Is it your object, as the head of the South London Gas Consumers' Mutual Protection Society, that all the companies should have the power to lay down their mains in all the roads?

Witness: Well, no it is not. I believe that, under proper supervision, it is probably the right principle for one set of mains to go down a road, and not two or three sets. I know that very great evils attend that. My conclusion is that, under certain modifications and guards, districting instead of being an evil is a benefit.

Sir W. HAYTER: Is it your opinion or not that the persons who are the most interested—that is, the companies—in getting the largest dividends, and supplying gas over the largest space of ground, are the best judges to determine what is best for both themselves and their consumers?

Witness: They know best what is for their own interest.

Sir W. HAYTER: Can they have an interest distinct from their consumers'?

Witness: They have an interest in getting as much as possible out of their consumers when they have no opposition, and they cannot now come upon each other's ground. With reference to one of the grievances of which I spoke, that of a person being compelled to pay 30s. though he does nor burn gas to the amount, I do not know whether it is a rule which prevails with all the companies or is confined to one or two. I do not know whethet it does with the South Metropolitan or the London; but, as to the Phœnix and the Surrey Consumers', it does. I know, as a fact, that a person has deposited 30s. with the company and has not received his equivalent in gas. I believe there are two or three instances which we shall be prepared to bring before you. It is the custom generally, and we have evidence of two or three. I propose that that should be remedied by a provision enabling a man to have light and to pay for only what he has. The companies do incur some expense in bringing the gas to the consumers' houses, but in the cases referred to the men are lodgers, and the gas is already in the house, and supplied to the shop or places below. I think with regard to housekeepers the charge is not too much. I have cast my eyes over the clauses in the Imperial Gas Act. The second complaint I made was, that the in-coming tenant was obliged to pay the arrears for gas supplied to the out-going tenant. There is a clause in the Imperial Act which forbids that, but I do not know anything of the dealings of the Imperial Company under that Act. I think the insertion of such a clause in a general Act would be a sufficient protection against my second complaint, and would be very satisfactory. My third complaint was as to the cutting off the gas on occasion of very trivial disputes. Of course it is an injury to the company to lose the sale of gas. Their interest clearly is to sell as much as possible. There may be a difference of opinion as to whether a complaint is trivial or non-trivial. Probably the companies would not consider a dispute to be trivial the consequence of which would be to their own injury. My next complaint referred to the registration of the meters, and I stated that, with the same burners, the gas burning the same number of hours, and the same charge for gas, the bills furnished show a considerable increase in amount. I cannot account for it; we consider it perfectly unaccountable. I believe it is from the gas being forced irregularly.

Sir W. HAYTER: Have you not a scientific person in all that long-named association who can explain the mystery?

Witness: We do not know how it is. It has been called "the mystery of the meters." Mr. Croll, perhaps, who has the Surrey Consumers' Company, will be able to tell. We believe that, if there was a person appointed who understood the gas-meter in the same way as a watchmaker understands a watch, he would be able to tell accurately.

Sir W. HAYTER: Surely, if representations are made to these companies that a great evil exists, and that there is great facility for discovering it, an attempt should have been made to do so?

Witness: We have made attempts to discover it, and I know a man who paid great attention to the subject, and it puzzled him completely. The gas bill rose 20 or 30 per cent.; though he was burning the same gas the account was so much more.

Sir W. HAYTER: And yet you say a person could easily find it out?

Witness: I do not say it would be easily found out, but I believe if a person were appointed whose time was wholly devoted to it, he would do so. There are such persons appointed by the companies. Great complaints have been made to the companies on the subject, and there has been an inspection of the meters, but still the evil goes on. I do not know of a case in which that has been the case, but there is a gentleman here who is one of the guardians of Bermondsey, where the gas bill for the workhouse was £70 or £80 instead of £30; and they have had an investigation, but cannot tell the reason. The master of the workhouse reported that the gas was burnt the same length of time. I have seen a sudden rise of the flame—a gush of flame with a considerable body—as though there was unequal pressure. Whether this was accidental or wilful I am not prepared to say. I speak of the fact that the meters have registered a considerably larger amount of gas. It is not a single complaint, but a general one, and I could bring fifty witnesses to prove it. It does not apply throughout all the districts, but especially to that supplied by the Surrey Consumers' Company. It applies to public and private lights. The gas charges have increased very considerably, and the accounts are more than when we paid 6s. per 1000 under the Phœnix or South Metropolitan Companies. The gas companies have not adopted any measures to remedy that evil, so far as I know. I do not know whether they have declined to do so—I am not prepared to say that, but we have no remedy at present. While more gas is charged for, less light is given, which arises from the less illuminating power of the gas; but it is very much better lately. There is a clause in the Act before me (the Imperial Act) which authorizes the appointment of persons to test the illuminating power of the gas. I think it is a very satisfactory clause, and if it could be adopted in a general Act, or the companies would agree to accept it, it would be to a certain extent a remedy; it would be better than having no protection at all. I observe there is a maximum price of 6s. fixed in this Act: I should like 4s. better. The price charged in South London is 4s. 6d.; in the City it is 4s.

Sir W. HAYTER: You are aware that the City is a concentrated area, and that that price, for such an area, would give a better return than in a wider area and remote streets?

Witness: No; but these districting arrangements have given each of the companies a concentrated area. I think there should be a sliding scale as to price. I am not prepared to give any direct information upon the subject, but it appears to me that, as the gas companies raise the price of gas when coals are higher, they might fairly be called upon to reduce it when they are lower. I think an absolutely fixed price would generally fix the consumer with the highest price. I have not, however, found it to be so.

Sir W. HAYTER: Is it not, therefore, an error in your judgment?

Witness: We believe that the reason they have not charged 6s. in Southwark is because of our association with the long name. I am not prepared to state that the effect of that association has extended to both sides of the water. There has been competition on this side, which existed almost down to the present time. That has kept the price from being raised, I have no doubt. There are two companies in the City. I believe the price of gas has been generally reduced since 1829: when first introduced it was very high. I should not be surprised to hear that in 1829 the price was 15s. per 1000. I have heard it before.

Sir W. HAYTER: I may state that the price charged by the Imperial Company in 1831 was 13s. 6d.; in 1833, 12s. 6d.; it was reduced to 10s. in 1836; to 9s. in 1844; then to 6s.; then 5s.; and now it is 4s. 6d.; so that there has been a continual reduction ever since 1829 to the present moment.

Witness: There have been great improvements in the manufacture.

Sir W. HAYTER: But does not that prove to you that the companies are prepared to diminish the price consistently with their ability?

Witness: I cannot admit that, because I know what the companies have done in the south of London.

Sir W. HAYTER: You say that the price should be regulated by the dividend—let me ask you what price the London Company ought to charge who have not paid any dividend for twenty years?

Witness: I do not think the consumers should pay for bad management. I do not know what brought them into that bad condition. I am not prepared to say what would be a fair dividend for capital invested in commercial speculations. Some persons like large risks; others are content with smaller dividends and less risk. I should think 10 per cent. a very high dividend, with the protection which the gas companies have, though I believe that several Acts of Parliament fixing 10 per cent. as the maximum have been passed. I do not say it is an unreasonable dividend, and I think they might pay it and yet satisfy the public. The companies have paid enormous dividends. At the present time I am not aware what they pay. I should not be surprised to hear that no company pays more than 7 per cent.

Sir W. HAYTER: If the dividend is to be considered one of the elements in fixing the charge, and that dividend depends upon the price, is it unreasonable that they should have a maximum beyond the price now charged?

Witness: I am not prepared to say that it would be unreasonable that a price should be fixed as a maximum; but at the same time I repeat that, when a maximum is fixed, the consumers generally will have to pay that maximum.

Sir W. HAYTER: But is not your theory practically unsound, when you find—in the Imperial Act, for instance—the maximum is fixed at 6s., and the price is 4s. 6d.?

Witness: But I am looking forward to what it will be when these districting arrangements are legalized.

Sir W. HAYTER: Your complaint is not actual, but prospective?

Witness: It is.

By Sir B. HALL: Assuming that the districting arrangements are beneficial to the companies, there have been no corresponding advantages offered to the consumers. The bill to legalize those arrangements was introduced in 1855—it passed a second reading—and it was in committee that the opposition was threatened. I believe the opposition originated with yourself; and, in consequence of that opposition, the bill was withdrawn.

By Sir W. HAYTER: The opposition was manifested in the House and out of it.

By the CHAIRMAN: A committee was appointed to whom the bill was referred.

By Mr. BARROW: I believe they did not go so far as to take evidence upon the bill.

By Sir B. HALL: None of the arrangements proposed to be legalized under that bill have been altered, and the companies on the south side of the river still supply gas to the same districts they did then. With reference to the first grievance, I complain of, that of the consumer being required to make a deposit with the company before getting a supply, I believe it is 10s. a light which is required. Whatever it is, I think it is a peculiarly hard case.

The CHAIRMAN: Do I understand you to say now that the sum is not 30s. or 40s., but 10s. which has to be deposited?

Witness: It is 30s., absolutely.

By Sir B. HALL: I think the second grievance, that of requiring the incoming tenant to pay the arrears of the old, would be remedied by the clause in the Imperial Act.

Sir B. HALL: I will pass over the third grievance, that of cutting off the gas in cases of trivial dispute, and come to the registration of meters. Supposing a competent officer were appointed by the Board of Trade, or the

Justices in Quarter Session, or by some other authority independent of the gas companies, who should have power to fix a proof mark upon those meters and inspect them from time to time; and that each district board of the metropolis should be able to appoint two or more persons to report upon the supply of gas to the district, do you think that that would get over the evil, which you think is a material one?

Witness: I think it would.

Sir B. HALL: Do you really believe, with regard to the fifth grievance you put forward, that the light afforded now by the companies, or by some of them, on the other side of the river is inferior in quality than what you had before?

Witness: In former times the gas was not good, but since this agitation it has been better.

Sir B. HALL: Your attention has been called to the diminution in the price charged for gas since the early days of gas manufacture in London—may not that be attributable to various causes, such as improvements in the manufacture and greater facilities for the carriage of coals, also a reduction in the cost of the materials used in the construction of the works and mains?

Witness: All these, of course, are elements to be taken into consideration, but especially the more general consumption of gas, which must be as 100 to 1 within my recollection. It would be much more general still but for these obstructions. Every working man might use gas with advantage. The consumption being greater on any particular line of main would be more advantageous to the company, and they would get a larger interest on their money.

Sir B. HALL: You have stated that, whatever the dividends of the company may have been, you believe in some instances—and I understood you to state, in several instances—the companies have, independent of the profits divided, executed works out of income, instead of by outlay of increased capital?

Witness: I believe it to be so; and, consequently, the net profits derived by them are greater than shown by the dividend.

Sir B. HALL: In the Imperial Gas Act, 1854, there is a clause (sec. 4) which incorporates the Companies' Clauses Act, the Land Clauses Act, and the Gas Clauses Act, and there are other clauses to the effect that the company shall not require from the in-coming tenant arrears due by his predecessor; determining the quality of the gas; authorizing trustees, vestries, and public boards, to appoint a chemist to test the quality of the gas; and imposing penalties upon the company if they offer gas of less illuminating power than is set forth. Do you think it would be desirable that some legislation should pass in which these several clauses should form part, and which Act should ride over the whole metropolis?

Witness: I believe it is most desirable.

Sir B. HALL: Supposing those clauses were introduced, do you believe they would meet the greater portion of the evils complained of by the gas consumers, and that the main question at issue would then be the maximum price to be charged for gas?

Witness: I do so.

By Sir JOHN SHELLEY: I come here to complain that, whereas Acts of Parliament were given to several companies to supply the southern side of London, owing to these districting arrangements the supply is confined to only one company in each. I do not know whether it is a fact that the companies authorized to supply were the South Metropolitan, the Phœnix, the London, and the Chartered. The actual state of fact is that there is only one in each district, though it is just possible that, with their margin or boundary, you might have the whole four companies' mains at any one point. I know the district of Christ Church, Southwark. The company that supplies it is the Phœnix. I complain that the effect of this arrangement has been to create monopolies in each, and that the consumer, if dissatisfied with the quality of one company's gas, cannot go to another. The Surrey Consumers' Company are paying 8 per cent. dividends, and I believe it is a matter of notoriety that the City Company have increased their capital very largely out of profits. I see the JOURNAL OF GAS LIGHTING occasionally. I do not know who is the proprietor. It is supposed to be in the interest of the gas companies. I am not prepared to state whether there has been published in that JOURNAL a comparative return of the capital, the income, and the expenditure of the metropolitan companies. I do not know, in fact, what dividends they have paid upon their capital; it may be as high as 8 per cent. I know the Surrey Consumers' pay that. I stated that I was aware the price of gas had been greatly reduced since 1831, and that fact leads me to think that it might be reduced still more. I am prepared to prove that the actual price paid for public and private lights is greater, although the cost of gas is apparently lower.

By Mr. BARROW: I am not prepared to say that the price at the workhouse is higher in money now than the number of feet of gas consumed justifies. I am prepared to say that if the meter is accurate now it must have been inaccurate before.

Mr. BARROW: Science has invented a better meter, and, consequently, the quantity of gas delivered is, perhaps, more accurately measured of late than before.

Witness: I am not prepared to admit that; it may be so, undoubtedly. I believe the meters have been inspected and no apparent error detected. That leads me to think there may possibly have been an improvement in the meters. The circumstance which I have named as increasing the flame at the jet would have an effect upon the quarter's consumption. With respect to the 8 per cent. dividend, that has been paid upon the entire capital.

Mr. BARROW: When you talk of entire capital, do you mean to say that if for many years the companies have divided only 2 per cent. and have laid out 3 per cent. of their earnings in augmentation of works, they are not entitled to a profit upon that?

Witness: It is having a profit in the Surrey Consumers'. With respect to the deposit of 30s., my evidence was, that where the gas was already in a house, no separate lodger could have a supply to his room without paying that amount. They will not supply him for less. I believe it is 10s. with regard to householders. With reference to the cutting off the gas in case of disputes, I will give you an illustration which came under my own knowledge. A patient of mine, upon whom I called one day, I found with his place in darkness. I asked the reason, and he showed me his account. It was £1. 17s. 6d.; he had tendered £1. 16s., which was the amount which his meter registered; and upon this dispute about 1s. 6d. the company cut off his gas the next day and left him in darkness. I know that in such cases the consumer has no remedy at all.

By Alderman CUBITT: I do not think the consumers generally would be satisfied to take the Imperial Gas Act, with a provision for the appointment of an officer to inspect the meters, if the maximum price was 6s. unconditionally. Certainly not, because there might be great improvements in the manufacture and production of gas, and I think the consumers ought to have some provision for a fall in price. I think 6s. is too high. I am not prepared to suggest a maximum, nor any machinery by which, from time to time, the price might be regulated. As I stated before, I leave that to the wisdom of Parliament.

Alderman CUBITT: Only the wisdom of Parliament grows out of the evidence of competent witnesses.

Witness: Doubtless; but we prove our grievances, and ask you for the remedy.

By Mr. WHITBREAD: The price of gas was 7s. before 1849, and I think it had then been reduced to 6s. I do not know whether the companies have any legal rate. It was thought advisable at that time to start the new company for the purpose of bringing down the price. Gas then fell to 4s. In 1853 the districting arrangement was come to, and in 1854 the price was raised to 4s. 6d. Since then the company which was started to bring the others down has become by far the greatest sinner of the whole. It was a "Consumers'" Company, but they leased it to Mr. Croll. In 1855 the "South London Gas Consumers' Mutual Protection Society" was formed, and they complained that, though the price of gas was lowered to 4s. 6d., the consumers were paying more than they did before. I will correct what I stated previously on this point. They complained that the increase was 40 or 50 per cent. more than when the gas was at 4s., and considerably more, in many instances, than when they were paying 6s. I complain of the deposit from a lodger being required before he gets a supply, because I think it unreasonable, not in principle but in amount. I do not think it unreasonable that they should charge something. It is fair to make a man pay something, for he may go into a house for a week or a month, and then go no one knows where. In reference to the case of the gas being cut off on a dispute of 18d., I do not believe there was any other ground for the company doing so, or that they supposed the meter had been tampered with. There was nothing of the kind; and in that case the company held £2 of his money as a deposit. I frequently attend at the workhouse, and I see constantly the same flame. The general tenor of my evidence as to the meters is, that they are not correct. It has never occurred to our ingenuity to fix a meter beyond the company's meter, to test whether it registered correctly; and if we had done so the company would not be bound by it.

Mr. WHITBREAD: But it would have been a strong case to go to law with?

Witness: It would have been; but we never tried it.

Mr. WHITBREAD: About the burner throwing up a different strength of gas at different times, did you ever try the expedient of a gas regulator?

Witness: No, we never tried it.

By Mr. JACKSON: The effect of the competition with the companies on our side of the water has been combination; and the public have suffered by competition through combination. I believe if the inhabitants of Southwark were polled, they would say that they were better off before. We think the new company have betrayed us by selling themselves to the other companies. That would be the case if another company started—competition becomes combination. I think the consumer should be benefited by the districting arrangements, because there is a great economy of gas to the companies. I am not aware of the effects of the combination between the two companies at Liverpool, nor did I know that since it has taken place the price of gas has been reduced from 5s. to 3s. 9d. I should not object to give the companies now in possession of these districts a fair dividend for the use of their capital. I think, though Parliament has sanctioned 10 per cent. as a general rule, it is a high figure.

Mr. JACKSON: Parliament having given that generally, if steps could be taken to provide for that, and also a regulation to ensure a reduction in the price of gas, you would not object to that?

Witness: I do not think the consumers would care what dividend the companies had, if they gave a supply of good gas at a low price.

Mr. JACKSON (to the chairmain): I do not know whether I should be right in stating what has been done in Liverpool. Should I be in order?

The CHAIRMAN: It is quite fair to put a hypothetical case, but we cannot take it that it has been done in Liverpool.

Mr. JACKSON (to witness): Supposing a price to be fixed by Act of Parliament between the consumer and the producer which never could be exceeded, and the effect of the increased consumption should be to diminish the cost of gas, should you see any objection to this arrangement being come to?

Witness: No.

Mr. JACKSON: Would you see any objection to a reserve-fund being created beyond the 10 per cent., so as to give the companies something to fall back upon, instead of again increasing the price of gas after it is once reduced—the reserve-fund to be only that the companies might have regular dividends? Supposing that, after paying 10 per cent. and creating a reserve-fund of £3000 or £4000, the effect should be to bring down the price of gas 6d. or 9d. per 1000, would you think it fair to have such a reserve-fund to prevent the future consumer having his gas raised?

Witness: No, if it could be proved.

Mr. JACKSON: Supposing it were proved, in the case of Liverpool or any other town in the kingdom, that there had been a fixed price beyond which the companies could not go, and a reserve-fund for future dividends, and that the effect was invariably to produce a reduction in the price of gas, should you think it satisfactory to the consumers of the metropolis?

Witness: There is a fixed price at the present moment in the south of London, but there has been no reduction to the consumer.

Mr. JACKSON: Because the companies have never got 10 per cent.

Witness: They are getting 8 per cent. in the Surrey Consumers', and the Phœnix are rapidly rising to that point. I have no doubt the increased dividend has been the effect of non-competition. To some extent less capital will be required by a district being assigned to each company, instead of each company being obliged to supply the whole. I think if the consumers are properly protected, the division of the metropolis into districts would be beneficial.

By Mr. ROUPELL: I admitted, in answer to Sir W. Hayter, that the companies, when they cut off the consumers' gas pending a dispute, injure themselves, because they sell less gas; but I have found that the companies calculate upon the contumacious consumer speedily giving up the point at issue, because the gas is to him a positively necessary article, and the companies may fairly infer that it is only a question of time how long the man may be able to hold out. Almost invariably the gas is put on again in two or three days, and the consumer is charged 5s. for its being done; so that upon the whole there is no loss to the company. They "hedge" by charging for putting on the gas again. I did not say that foul air is mixed with the gas supplied to us, but that it was not of so good a quality. It is a mere impression. I have frequently observed, when the burners are turned on, that a quantity of foul air goes through before the gas appears, and, when it does light, I have observed a spluttering and an intermittent combustion. I have never tested the air in a room where the gas is burning. I believe the gas is moderately pure throughout London. For a few days the companies were supplying Bermondsey with unpurified gas, but that, I be-

lieve, was an accident. No doubt there is a small portion of sulphuretted hydrogen in a room where gas of the kind I refer to is burned. I believe one cause of the meters marking more gas than is actually consumed arises from increased pressure in the pipes; and another cause, that the gas is what is technically called "thinner." Unequal pressure I believe to be another cause, which accounts for the unequal combustion and for the flame leaping up when the light is applied. As a scientific man, I am aware that gas passed by unequal pressure would have the effect of causing it to escape unconsumed from the burner—so that, though the gas goes through the meter, it is less likely to be consumed. I believe that almost all the gas companies in the metropolis have expended much more money than they had any occasion to do. They have spent much money in experiments.

Mr. ROUPELL: Is it not your opinion that their preliminary expenses have been very great, and that if they were allowed 10 per cent. upon their capital, whether judiciously expended or not, it would be tantamount to a premium upon extravagance?

Witness: It would be where a large amount of capital has been expended in waste, or to secure a monopoly of district. No doubt if the capital of the various companies had been judiciously expended a much larger dividend would have been received. I think a scheme for regulating the profits of a gas company by means of a sliding scale would be on the whole more satisfactory to the consumers than a fixed maximum, without reference to the expenditure, whether judicious or not. It would be the most just course to take, and would make the supply of gas dependent upon the cost of production.

By Mr. ADAMS: I am at a loss to say how a company could possibly be benefited by forcing the gas without consumption. I should think that half only of the grievances which I have enumerated apply exclusively to the Surrey Consumers' Company. It is a main grievance with us against that company that, by some process not at present understood, the quantity of gas registered by the meters is greatly in excess of the quantity apparently consumed. I burn the South Metropolitan gas at my private house and the Phœnix at my dispensary, and I am satisfied with both. We complain also of having to pay for the gas consumed by other persons, which is a general rule with the Phœnix. It is a very vexatious thing to have to pay another man's debts; but that is not so great a grievance. I believe that these grievances arise in many instances from the servants of the companies—probably without the companies knowing it, but they feeling that they have arbitrary power. It has been in those cases from the misconduct of the servants, and not the orders of the masters.

Mr. ADAMS: Can you suggest, by giving you an Act of Parliament to any extent you like, any mode by which the arbitrary conduct of servants can be avoided?

Witness: The servants have no special orders to the contrary.

Mr. ADAMS: No—you do not give your servants orders not to break a dish. You, having a large society, has it ever occurred to you to provide yourself with some simple apparatus by which you might be able to test the quality of the gas?

Witness: We have had many plans before us, and we have many grievances, but it has never occurred to us to do so. With reference to the pressure, the jerking which I spoke of does increase the consumption. If we had an opportunity of putting a meter at another place than the works, the jerking would operate upon that also; so that, as concerns this point, it would be useless for the purpose, as it would not give a proper indication. The greater part of the grievances of which I complain have been the result of the combination entered into by the companies in 1853.

Mr. ADAMS: I do not understand you to say that districting is in itself an evil?

Witness: The consequences are.

Mr. ADAMS: But I am asking whether you suggest that districting is a something which ought to be forbidden by Act of Parliament?

Witness: I should say that if the results invariably follow which have followed in this case.

Mr. ADAMS: But is it necessary they should follow?

Witness: It seems to be the case where there are no protecting clauses.

Mr. ADAMS: I understand you now to say that you think it desirable districting should be forbidden by Act of Parliament?

Witness: Unless there are protecting clauses, undoubtedly; that is to say, it may be allowed under certain restrictions.

Mr. ADAMS: May not great good result if it is carried out under proper supervision and control?

Witness: I think there would be, and that the public health would be increased. It is a bad thing to have the pipes of several companies running through the same street. Sometimes the pipes of the wrong company get tapped; therefore it is not against the system of districting, but unrestrained districting, that I object. Since the formation of our society there has been no increase or reduction in the price of gas. Since 1854 there has been no increase in price in any way, and the districts continue as they were then. I am not aware that the Surrey Consumers' Company have given up any portion of their district to another company, or that the South Metropolitan Company have given up a small portion. They have made their arrangements: there has been no alteration.

By Sir WILLIAM DUNBAR: I do not object to districting under proper safeguards. The clauses referred to by Sir B. Hall would, with the exception of the price, meet most of the difficulty. The objection I stated to a maximum price was this: that, unless it was regulated by other circumstances, the maximum price, as a rule, would be charged when these districting arrangements were legalized.

Sir W. DUNBAR: But supposing these clauses were imposed upon the companies, would you in that case be in favour of a maximum price?

Witness: I should prefer the price of gas to be regulated by the price at which it is produced.

Sir W. DUNBAR: I understand you to say that you wished that maximum to be fixed at 4s. 6d.?

Witness: I should like that, but I am not aware that I said it. I am in favour of a sliding scale.

Sir W. DUNBAR: Supposing the maximum is fixed at 4s. 6d., and it can be shown that that price is the minimum at which gas can be produced consistently with a fair profit to the company, how would you meet the contingencies which arise from a change in the price of coal and other materials?

Witness: I suppose their affairs would be attended with some risk; undoubtedly it would induce economy.

By the CHAIRMAN: The 4s. price was charged for three years, and until the districting arrangements were entered into. I do not know what rate of dividend the companies paid during that time. I believe the competition was so great that they supplied large consumers at something like 2s. under contract, and that they supplied publicans by contract. I believe they found their waste was something like 20 or 30 per cent. of the gas actually manufactured, and that was felt to be a very serious injury. Since the districting the waste has been diminished to something like 5 or 7 per cent., and that alone is an enormous saving. During the time that 4s. 6d. has been charged the price of coal has been very high in London. That was the ground alleged for raising the price of gas to 4s. 6d. The Surrey Consumers' Company started with 4s. as a maximum, which was never to be exceeded. They raised the price when the districting took place.

The CHAIRMAN: Is it not the case that, when the increase to 4s. 6d. took place, the price of coal and other materials was very high?

Witness: Yes; but there has been a general fall during the last two years particularly. Coal has been very cheap the last year.

The CHAIRMAN: You have stated it as your belief that if a maximum price was fixed by Act of Parliament, that maximum would, as a rule, be charged. Do you know any single instance in which a company entitled to charge a maximum have done so?

Witness: No, because competition prevents them. Take away competition and they have no fear.

The CHAIRMAN: Can you give an instance in support of the rule which you say would prevail?

Witness made no reply.

The CHAIRMAN: With respect to these Acts of Parliament—you have been chairman of the association for many years?

Witness: Three years.

The CHAIRMAN: I understand you to come here not being able to find a remedy for the grievances complained of, and yet you are not able to give an account of the existing Acts of Parliament?

Witness: I have endeavoured to do so. I think I have shown that the operation of the existing Acts of Parliament, so far, has been productive of great hardship to individual consumers.

The CHAIRMAN: I understood, in answer to the right honourable baronet, you said you were not acquainted with the clauses of the Acts of Parliament?

Witness: The Imperial Act does not apply to the south of London at all.

The CHAIRMAN: I thought I understood you to say that you did not know the Acts of Parliament for the south of London?

Witness: I do not know whether they confine the companies to certain districts or not.

The CHAIRMAN: With respect to those companies which have been paying for works out of revenue, do you make that statement after investigating the financial position of the companies, or do you give it as a general impression, which you have derived from some report which you have happened to read some months ago, and which is the best impression you can give us in your own recollection?

Witness: It is. I have had under investigation the last report of the Phœnix Gas Company.

Mr. RUSSELL: I think you stated that a monopoly practically existed, but that is contrary to the statement which you made, that if the companies at one time persevered in raising the price 6d. another company would be formed?

Witness: We were threatening to form a company.

Mr. RUSSELL: Then surely that was proof that no monopoly existed, and that you had the remedy in your own hands.

Witness: But still it was a dangerous one. We felt that the Act they were applying for would legalize what experience showed us was a monopoly. It is an existing monopoly, though we may have a remedy against it.

Mr. RUSSELL: How did you arrive at the fact that a portion of the expenses of the Phœnix Company was borne by revenue, which should have been paid out of capital?

Witness: I read their report with a friend. It appeared to be a faithful account, and that was the impression it conveyed to my mind.

This closed the examination of the witness, and the committee adjourned till Tuesday (this day).

Legal Intelligence.

COURT OF QUEEN'S BENCH.

(*Sittings in Banco, before Lord* CAMPBELL *and Justices* COLERIDGE *and* ERLE.)

THE POPLAR DISTRICT BOARD OF WORKS *v.* KNIGHT AND OTHERS*.

Lord CAMPBELL, in delivering judgment in this case, said the district board had caused certain houses belonging to the respondents to be demolished, and had caused a portion of the Marsh Wall, removed by the respondents, to be reinstated, and had claimed £5. 5s. 6d. and £21. 14s. 2d. as the expenses of these operations, and the question upon this appeal is whether they can sustain that claim, either under section 204 or section 76 of their Act. By section 204 the board had this right in respect of "any building erected in, over, or under any sewer vested in them." The respondents had cut away part of the Marsh Wall, built thereon, so that under this section the point is whether the Marsh Wall was a sewer within its meaning? The wall, according to the case, keeps back the river Thames at high water from inundating the Isle of Dogs. It is, therefore, essential to the drainage of the level; quite as much so as the channel which actually drains the Isle of Doga at low water. Both form one apparatus; and, if either was lost, the level would be uninhabitable, and thus from its nature it seems to us to be part of the sewer of the level. Also the Legislature uses the term "sewer" in this sense. By section 68 the sewers, with the walls, banks, outlets, and sluices thereunto appertaining, are vested in that district board. The "walls" and "banks" are here named to appertain to a sewer as much as "outlets" and "sluices." Section 69 commands the district board to repair the sewers, and among the repairs they are commanded to cause to be maintained such sewers and works as may be necessary for draining the district, and further to cause all banks and defences adjoining any river to be repaired where it may be necessary for effectually draining or protecting from floods the district. Here again banks and defences are classed under the term "sewer," and the Marsh Wall is a bank and defence within the section, and is a sewer. If we regard the protection conferred by section 204, it seems more necessary for a bank or wall fending back the high water than for a gutter or drain carrying off the low water, inasmuch as the inundation from high water might be more suddenly and widely destructive than the gradual rise of one drain. No reason is assigned why the Legislature should give summary power for preventing obstruction of a sewer-drain, and leave a sewer-bank liable to be undermined by foundations or encumbered with superstructures. Section 205 was relied upon by the respondents as showing that "sewer" in its general sense may mean the whole apparatus, and in its specific sense, a drain is part of that apparatus. Section 205 prohibits, among other things, sweeping rubbish into a sewer or a grate

* In the report of this case, which appeared at page 326 of the JOURNAL for May 25, the defendant's name is erroneously printed as Wright.

communicating with a sewer. Here the context shows that the specific sense is meant; and, accordingly, every time sewer is mentioned, the words "or drain" are added, as showing its meaning in this section. The expression "sewer or drain" occurs four times in four lines of this section, but the word "sewer" stands alone for the most part in other parts of the Act. A point was made, which is rather the form than the substance, namely, that the property and power over the Marsh Wall was in the metropolitan board and not in the district board. To this our answer is, that the statute is not definite on that point, and for the purpose of the present appeal it is not necessary to scan the statute as it would be if the metropolitan board was in conflict with the district board. If that question should be raised between those parties it is probable there may be further evidence tending to its elucidation; but we decide the present appeal in favour of the appellants on this point, because it is stated on the case that the metropolitan board has never exercised any jurisdiction over it, and the case shows that the district board, *de facto*, is in the exercise of that jurisdiction; and, as against the respondents, his letters are abundant evidence to prove that he treated with the district board as having the jurisdiction, and now resorts to the point of form to evade a judgment on the merits. If it was necessary for the appellants to claim under section 76, it seems to us to support their claim. It was said that the respondents had neither dug out nor laid any foundation, but placed their houses on the ground without a foundation in its ordinary sense; but we are of opinion that all houses stand on a foundation within the meaning of this Act, and the Legislature appears to us to have expressly provided for houses standing on foundations placed on the surface, as the enactment says "before beginning to lay or dig out the foundation of any new house." It seems to have contemplated that some foundations would be laid without any digging out; and, if the respondents had no other answer to the appellants' claim of the 76th section, our judgment would be against them on this point also. The claim for fees to counsel, on advising the district board, was properly given up on the argument. We are, therefore, of opinion that the magistrate's decision was wrong; and in pursuance of the powers mentioned at the end of the case, we order that the respondents pay to the appellants £5. 5s. 6d. and £21. 14s. 2d., and the costs of this appeal—that is, the costs of the paper, books, and argument. My brother Crompton is not satisfied with the conclusion at which we have arrived, and particularly doubts whether the wall in question is a "sewer" within the meaning of either the 204th or 205th sections.

COURT OF COMMON PLEAS.

WESTMINSTER, JUNE 8.

(*Sittings in Banco, before Lord Chief Justice* COCKBURN *and Justices* WILLIAMS *and* WILLES.)

FRIEND *v.* BENNETT.—INVALIDITY OF CONTRACTS WITH LOCAL BOARDS OF HEALTH NOT UNDER SEAL.

This was an action for work and labour done by the plaintiff in draining the town of Worthing for the Local Board of Health, and was brought against the defendant as the public officer and clerk of that body.

A rule was obtained to set aside the verdict for the plaintiff on the ground that the contract was not entered into according to the form given by the statute. It was admitted that the work had been done, and that five members of the Local Board of Health, whose duty it was to enter into the contract by deed, and to affix their seals to it, had expressed their assent to the written contract, but had not signed it or affixed their seals to it according to the provisions of the statute.

Mr. LUSH, Q.C., and Mr. HANCE showed cause against the rule, contending that the Board of Health were not a corporation who could only contract by deed under seal; that the work ordered to be done was matter within the jurisdiction of the Board of Health; and that there were no prohibitory words in the statute against entering into a contract in this form.

Mr. FIELD (with whom was Mr. HAWKINS) submitted that the amount recovered by the verdict must be paid out of the rates, and that the statute intended that the ratepayers should only be charged on the contracts of the Board of Health solemnly executed by five of the members; no doubt this was intended as a precaution, and to prevent injustice being done to the ratepayers.

The LORD CHIEF JUSTICE: It is right when the court sees a scandal brought on the administration of justice to express its opinion. Here a contract has been entered into by the Local Board of Health of Worthing with a gentleman to do work for them, and he has done the work; and then they turn round on him and say, "We will not pay for the work because the contract is not under seal." I never knew a dirty defence set up in my life but it was said there was justice behind it.

Mr. FIELD said he had only to argue an abstract question of law, and to lay before their lordships the principles and decisions which must govern this case, and on which he had to submit that their lordships ought to make the rule absolute.

The LORD CHIEF JUSTICE: It is quite clear that we must decide this case on the abstract principles of law brought before us; but I do not think we go beyond our province in saying that this is a scandalous and dirty defence. I quite feel for the position in which you are placed. It has been held before that public bodies have no conscience.

Mr. FIELD: The 85th section of the Act of Parliament enacts imperatively that all contracts must be under seal, and that in making a contract five members of the board must meet together and affix the seal.

The LORD CHIEF JUSTICE: Five of these people did sign the contract.

Mr. FIELD: No, my lord; they were present, and signified their assent to it no doubt, but they did not sign or seal the contract. The power to bind the ratepayers is given by the statute, and in a particular mode. This has not been pursued, and I therefore submit that the ratepayers cannot be charged, and that the rule must be made absolute.

The LORD CHIEF JUSTICE: I regret that the court is obliged to make this rule absolute. It is sought in this action to make the rates liable by means of an action brought against the public officer of the Local Board of Health. The power to enter into a contract with the Local Board of Health, so as to bind the rates, is entirely a creature of the statute; and the very same statute has prescribed the form in which they shall so bind the rates. It is part of the power; and the Local Board of Health have no power to bind the rates unless they enter into contracts in the manner prescribed by the Act. I am therefore sorry to say that this rule must be made absolute.

Mr. Justice WILLIAMS was of the same opinion. Persons contracting with these Boards of Health could only do it in a particular way to make their contracts binding.

Mr. Justice WILLES was of the same opinion. Powers given by Act of Parliament must be strictly followed. He regretted in this case to be obliged so to decide. This was certainly not the first instance of fraud proceeding from the same source which had come within his own observation.

Rule absolute.

WORSHIP STREET POLICE OFFICE.

TUESDAY, JUNE 10.

(*Before Mr.* D'EYNCOURT.)

GAS STEALING.

Mr. *William Johnson*, landlord of the Railway Arms, at Old Ford, Bow, was charged upon an information laid at the instance of the Commercial Gas Company with the following offence.

Mr. *Poland*, the barrister, who prosecuted on behalf of the company, cited the 10th of the present Queen, chap. 18, by which persons committing the offence the defendant was now charged with were rendered liable to a penalty of £5, and 40s. each day it continued, and called

James Ferriday, gas inspector to the company, who said that, in consequence of being directed by the company's officers to do so, he visited the defendant's house on the 24th ult. to examine his gas apparatus, and discovered that his meter had been removed altogether, and a leaden pipe substituted in its place, and fastened on to the company's main by a screw. By this means he must have used a large quantity of gas which the company knew nothing about, and this was rendered the more conspicuous by the fact that the defendant had nine burners upon his premises, while the meter supplied him was only a five-burner meter. On asking him what he had done with his meter he at first refused to produce it, but ultimately did so, and said he had been obliged to remove it two days before, in consequence of its being leaky and out of repair.

Sherwin, the company's meter-prover, however, deposed to the meter being handed over to him after its seizure for examination, and that on testing it he found it perfectly gas-tight and free from defect.

Mr. *Jones*, the company's chief engineer, deposed to the defendant, some days after his detection, calling on him at his office and entreating a merciful consideration of his case, as he had only used this extra gas on Saturday and Sunday morning. How long this system had continued it was impossible to fix, but it must have been for a very considerable time.

Mr. *Poland* said he only went now for two days' surreptitious use of the gas, but he hoped it would go forth to the public that in consequence of the length of time and great extent to which these nefarious practices had been carried on, the company had determined to prosecute all future offenders in this way for felony.

The defendant declared that there was a great escape of gas somewhere, which he could not detect, and as he was in great alarm for the safety of his wife and eight children, and it occurred at a time when no gas-fitter could be procured to remedy it, he detached the meter and made the alteration now complained of, but solely for that reason, and had no intention whatever either to deceive or defraud the company, and hoped his family and circumstances would be taken into consideration.

Mr. D'EYNCOURT said that, had the defendant's committal for stealing the gas been pressed for, he should certainly, after the evidence which had been given, have acceded to it; but, as the company treated the case as a warning only, and only sought a pecuniary penalty in this instance, he should sentence the defendant to pay a penalty of £5 for the offence, and 40s. for the pipe being so attached to the company's main, or in default the defendant would be committed for six weeks to the House of Correction.

IN THE ARBITRATION OF THE GREAT CENTRAL GAS CONSUMERS' COMPANY AND MR. ALEXANDER ANGUS CROLL.

(*Continued from page* 359.)

FOURTEENTH DAY.—SATURDAY, NOV. 21.

A long discussion took place at the commencement of this sitting upon the proposal previously made to try by experiment what was the pressure at the works.

The UMPIRE said Mr. Croll had asked as a favour that the arbitrators would direct an examination to take place; but Mr. May and Mr. Barlow both agreed that it would have no effect upon the material points in the case before them, and therefore it was not necessary to be done. He now thought it was necessary to have the concurrence of the parties to the determination of the arbitrators registered.

Mr. LLOYD said it seemed to him desirable that the matter should be cleared up, as it was a question of dispute between Mr. Croll and Mr. Wright as to whether the mode adopted for conveying the gas from the gasholder into the main did or did not decrease the amount of pressure. They had been going upon the assumption that the small bore which supplied the main was outside the governor, between it and the gasholder, whereas it turned out that it was between the governor and the main. This certainly made some difference; and he remarked that everything on his part which tended to show that they did not give the whole pressure they were capable of giving was an element in the case.

Mr. CROLL: The pressure indicated at the governor is not the true pressure at that point.

Mr. MAY: Is there any alteration in the apparatus now?

Mr. *Wright:* Not the slightest.

Mr. MAY: It strikes me that it would be satisfactory to have the matter tried, and it is very simply done.

Mr. BARLOW: What I stated was that, so long as the apparatus as now existing was capable of giving the requisite pressure in the City, the question was not material; but if any question arose as to the cause of the loss of pressure, then it might become a charge of want of skill on the part of Mr. Croll in designing the works.

Mr. LLOYD: We do not put it on the supposition of a want of skill, but as accounting for the fact.

Mr. BARLOW: You do not say that the pressure given was less than was required for the supply of the City?

Mr. *Wright:* This question in part turns upon the loss between Aldgate and Fleet Street. The assertion I have made is this—that the gasholder gives 47-10ths and only delivers 33 into the 36-inch main within the gates of the works, which is a loss of 14-10ths; and that the gasholder gives the same pressure and delivers into the 26-inch main only about 40-10ths. I have seen it about 38, which is a loss of 6 or 8-10ths. If we can show that a greater loss of pressure took place before it left the gates of the works than in its passage afterwards, I think it is material to show that.

Mr. MAY: I think it would be satisfactory to have the experiment made, first, as to the pressure at the works; secondly, as it leaves the works; thirdly, at Aldgate; fourthly, at Coleman Street; and, fifthly, at some point in Fleet Street.

Mr. BARLOW: It may be very satisfactory information, but I do not see how it bears upon the inquiry.

Mr. CROLL: Allow me to state that what I was desirous of proving was, first, that I was called on to give a higher pressure than was consistent with proper fittings, and a higher pressure after four o'clock in the morning for the supply of the market lamps; and, further, that if the system which

I proposed at the commencement had been carried out, of having two supply-mains, a considerable saving of gas would have taken place; because I should then have had by the back pressure from one main an indication of the lowest pressure in the City. As regards the other point, I again say that if the whole of the apparatus for giving pressure is made available, there is not that difference between the gasholder and the mains which Mr. Wright states, but is a tenth and a half only. As it appears to my mind, however, this has no bearing upon the case, because it is not the pressure at the works that I complain of, but the pressure in the City. Of course, I do not know whether or not the mains are clear; but, assuming that they are, with the supplemental pipe at the west end of the meter-house in action, the difference between one and the other would not exceed what I state.

Mr. LLOYD: If it resolves itself into a question of pressure at Coleman Street, then I concede that it does not matter what the pressure at the works is.

After some further conversation, it was agreed that the experiment requested by Mr. Croll should be made on the following Monday, in the presence of parties appointed by each side; and that, in addition to ascertaining the pressure at the several points indicated, the engineers should have their attention directed to the causes which had led to the increase of the temperature of the gas between the purifiers and the station-meters, which Mr. Wright had alleged to have taken place in consequence of the pipe passing between certain beds of retorts, and in contact with the large mains.

A long conversation also took place upon the minutes which had been put in and Mr. Croll's right to inspect the books of the company.

The following evidence was then called:—

Mr. *George Anderson*, examined by Mr. LLOYD.

I am a gas engineer, and have been acquainted with the construction of gas-works for upwards of a dozen years. At the early part of the history of this company I was with Mr. Croll for some time as assistant engineer. I superintended the practical erection of the whole, and saw to all practical matters.

By the UMPIRE: I was employed by the Central Company during the construction of the works.

By Mr. LLOYD: Afterwards I was upon the works while they were being worked by Mr. Croll. After the works started I was there three months or so. The works were not finished in the first year. They were added to from time to time, and it became necessary for me to visit the works from time to time in reference to those additions. I have seen the works since Mr. Croll gave them up. Not upon the day he gave them up. I saw them in April or May last. They were then in rather a defective state for manufacturing gas with a view to produce the most per ton of coal; and, from what I could see, I think about 7000 feet per ton would be as high as they could get from the works in the condition in which I saw them then. I have not observed the station-meters particularly. It did not fall under my notice as a matter of duty to examine them. I left the works some three months after they were erected. The meters, when constructed, have apparatus by which, if you open certain plugs, you will ascertain if they are properly charged with water. That, I suppose, you will call the overflow.

Mr. MAY: We have had evidence here that there was an overflow-pipe self-acting.

Witness: There was no self-acting overflow-pipe in action during the early part of the works. I do not know when there was for the first time. There has been an alteration; I can see that there is an overflow-pipe working. I saw that when I was there last, but I could not say when it was put there. The first time I saw it must have been a couple of years ago. I will, therefore, say there was no overflow to my knowledge before that time—not in constant action; although the means were there for correcting the meter at any time. I have observed the meters from time to time. Not internally. I have never interfered with them since they were erected. I have generally seen the water-line above the level.

By Mr. LLOYD: I have made some experiments with respect to the flame of the public lamps; and, assuming they were lit in the early part of the evening to burn 5 feet, my opinion is they would burn less than that during the whole of the rest of the hours of lighting. I have a diagram here, which I have made, which will perhaps explain it better than words. This [producing a diagram, showing a flame 4 inches wide by 2½ inches high] represents the burner burning 5 feet of gas per hour.

Mr. BARLOW: Under what pressure?

Witness: Under a pressure of 13-10ths. I may state, the pressure I found the lamps lit at was at a much higher pressure than I can give them here; that is the flame of 13-10ths at 5 feet. The pressure reduced to what I find it in the paper gives a light this size (3 inches wide by 2½ inches high).

Mr. BARLOW: It is a pressure of 8-10ths.

Witness: I found that that burnt 3½ feet. I found, too, according to the paper, that a year or two after we started the pressures were raised in the morning; I believe for the markets. If I raise the pressure then to 11-10ths, I get a consumption of 4 feet per hour with a flame 3¼ inches wide by 2½ inches high. [A diagram showing the three flames was put in.]

By Mr. LLOYD: I examined a great number of the pressure-papers, and it is from a comparison of a great number of them that I have made that diagram, which is a fair average result of these pressures.

By Mr. MAY: This is compiled from actual experiment, and from the pressure-papers taken at Coleman Street.

By Mr. LLOYD: From my experience as a gas engineer, and my acquaintance with gas-works, and knowing the system of pipeage and the mains of the Great Central Gas-Works, I should say the leakage might be from 16 to 20 per cent. In the case of the Great Central, there are some reasons why this leakage should be less, and some reasons why it should be more. There is no doubt, upon an average with other companies, it distributes its gas over a smaller area—and that is an argument in favour; there is also a great distance from the works to the City—that is an argument against. Then there is as much piping used in the City as would be equal to about a 6-inch main. Assuming the mains to be about the average size, and assuming that the Central Gas Company have about 70 or 80 miles, then, in the 18 miles used in bringing the gas up to the supply, there is some fifth part of the entire quantity lost; and then the traffic is very heavy. It is considered advisable to interfere as little as possible with the streets of London: you would not interfere with the streets of London as in the country. Again, there are two companies here, and one does not know if they smell gas whether it is one gas or another. That is the reason they are not so apt to open the streets of London; and the sewers are somewhat complicated. Those are arguments against; and my impression is that from 16 to 20 per cent. would be the given amount, inasmuch as I find a great many companies have from 30 to 35 per cent. leakage. With respect to temporary connexions, they are an established system; all gas companies use them, more or less. I do not think it would be possible to dispense with them for temporary purposes. I do not think any person who wishes to conduct his business respectably could do it. People are sometimes left without light, from some cause over which they have no control; and it would not be right to put them in the dark if you could give them light by giving a temporary connexion. I make a rule always to give persons a light. If it cannot be done without a temporary connexion I have given it, but of course I tried to avoid that as much as possible. If a temporary connexion is continued more than a night, there is no difficulty in estimating approximately the quantity that is consumed, and bringing it into charge; it is constantly done. I have been with the Surrey Gas Company; the leakage there was considerably over what I stated—some 25 per cent. That was at the time the company was under the management of Mr. Croll.

Mr. ARCHIBALD: I have nothing to ask this witness.

The UMPIRE (to Mr. Archibald): You made an observation that we had stopped you as to the evidence upon the temporary connexions.

Mr. ARCHIBALD: I had a number of witnesses here as to the waste of gas by that means, but I abstained from going on with that class of evidence, and went to the evidence on the engineering in consequence of a suggestion thrown out by you, that we had laid some sort of foundation, and that, with the view of shortening this inquiry, it was desirable not to go on building upon it; and I said that, if it should become necessary, I would ask permission to call my witnesses.

The UMPIRE: We intimated our opinion for the purpose of saving, as we thought, a great deal of trouble and an enormous expense to the parties.

Mr. LLOYD: What has hitherto been proved I have brought evidence to contradict, and I am prepared to show that all these temporary connexions have been brought into charge without exception. If further evidence is given, I must have the opportunity of showing the same fact as to them; therefore it will be for Mr. Archibald a matter of discretion whether he avails himself of the permission to go into these special cases again.

Thomas Hawksley, Esq., examined by Mr. LLOYD.

I am a civil engineer, and have been for many years practically acquainted with the manufacture and distribution of gas, having turned my attention a great deal to matters of this kind. I have been called upon by the Great Central to inspect and report upon the state of their works. My first visit for this purpose was made this day week. I have had brought before me the general arrangement of the mains and pipes of this company, and am aware of the system of distribution; it was brought under my notice on former occasions. As respects leakage and loss, where exhausters are made use of in proximity to the station-meter, the unaccounted-for gas is always greater than where the exhauster is not used. At the Great Central the exhauster is used, and taking that with my knowledge of the general state of the pipes in London, I should say 25 per cent. is not an extraordinary thing where the works have been some years in use. In fact, the unaccounted-for gas in the Chartered was, some years ago, as much as 35 per cent. This quantity of unaccounted-for gas is due to various causes—leakage, condensation, and other matters which are incidental to the distribution of all gas companies. I am not aware of any peculiarity in the Great Central works which would have the effect of diminishing the leakage beyond this, that the distribution is confined within a small space in the City, and the works are totally new works. These two circumstances would, no doubt, account for a smaller amount of leakage than is usual in a longer-established gas-work, and those that ramify over a larger space. The great amount of leakage proper occurs in the service-pipes; the leakage of mains is comparatively trifling, but the leakage from services is usually very considerable. There is a loss, too, from the street lamps, the cocks of which do not keep very tight, and sometimes they are left open. That is a large source of loss, but the greatest amount is from the services, partly from the joints, but much more from the rapid decay to which service-pipes are liable. They are usually made of wrought iron, which oxidizes in the ground with great rapidity, and there is a large amount of escape. With regard to street mains, I have frequently had occasion to test their leakage immediately after being laid down, and before service-pipes are put into them. I can give you an instance. I laid a 10-inch main, about 2200 yards long, the pressure at one end of which was one inch, and it rose in about 200 feet so as to give me nearly three inches at the other end. When a meter was applied for the purpose of ascertaining what the leakage was, it was found that the loss was, as nearly as possible, 5 cubic feet in a quarter of an hour.

By Mr. BARLOW: The main was in a good condition. It was laid up a steep hill. The mean pressure would be about two inches, because the ground was very regular.

By Mr. MAY: The loss was about 20 feet per hour. There was no extraordinary care taken with it; it was laid in the course of the work.

By Mr. LLOYD: I attribute more leakage to the service-pipes than to the mains. The services, in point of fact, rarely last longer than eight years in proper condition. With respect to condensation, that of course depends on the temperature of the gas at the time it leaves the station-meter and gets into the gasholder. I have made experiments with a thermometer for the purpose of ascertaining the temperature at which the gas comes into the station-meter. I was with Mr. Wright when the course of the pipe that conducts the gas from the purifier to the station-meter was ascertained. I do not know at all what evidence has been given upon the subject, and therefore I guard myself by making use of these observations. My view was on Saturday last; Mr. Wright may have made his observations at other periods, and may have given evidence as to other periods. I only speak to Saturday last. We found the gas entering the station-meter at 74¾°, and the external air was 55½°; that is, a difference of 19¼°. I did not take the temperature at the outlet of the meters. I took the temperature of the external air, because that would be the matter in question. The fact to be ascertained was, the increase of temperature as the gas entered the meter, because that increase of temperature might be expected to be increasing all the way along. As the mean temperature of London is a little over 50°, the mean temperature of the gas entering the meter may be expected to be a little over 70°. I took the temperature at the outlet of the condenser; it was 54¼°. It gained about 20° from the condensers to the meters. I also took it at the outlet of the purifiers, and found it 67½° at one trial; and going back again about an hour afterwards, it was 68½°, and that was at the time I found it 74¾° at the station-meter. I attribute the rise of temperature from that at which it left the purifiers until it arrived at the station-meter, to the fact of the main leading to the meter passing through the retort-house almost in contact with other pipes which contained highly-heated gas.

Mr. ARCHIBALD: Did you see this yourself?

Witness: I did. The ground was opened in various places, and I inspected them.

By Mr. BARLOW: It passes through the retort-house near the chimney.

By Mr. LLOYD: It is in contact within a few inches, with a pipe leading to the hydraulic main; and these circumstances, I think, satisfactorily account for the rise in temperature. I may mention that gas rapidly

increases in temperature with regard to atmospheric air, which is of similar nature to gas in these respects. We know this fact, that the quantity of heat which will raise a cubic foot of water one degree, will raise 2850 cubic feet of atmospheric air to the same extent; therefore it is easy to account for the increase of the temperature of the gas. I did not measure the condensing surface, but certainly one vertical condenser and a water condenser were in action. At the time we made the observations, I think the flues in proximity to the pipe were heated. One side certainly was heated, because I put my hand upon it, and felt it intensely hot. As to the other side, I did not try it, and I think it was not. The ground itself was very hot. I did not observe any sign of evaporation, vapour, or steam, as it was rather dark. If you add a normal addition of 20°—and that represents the excess of temperature over the atmosphere—the effect it would have on the volume of the gas would be to increase it about 24-190ths. In other words, one part in 24 or 25. The best experiments on this subject are those which are related by Gmelin in his great work on chemistry, which brings the subject down to the present time. They give the expansion of air or gases by the increase of temperature as 1-490th part for every degree of Fahrenheit above 33°; so that, practically, it would be about 4 per cent., and that would be due to that difference of temperature. When the gas enters the meter it is increased in temperature; it holds an amount of moisture in it in proportion to its temperature. It afterwards parts with that excess of moisture when it reduces its temperature, which it would do in the gasholder; therefore that quantity would not be found in the mains; but it would augment the quantity of water in the gasholder-tank slightly. There would be a little in the mains which, of course, would be pumped out at the syphons. The great quantity would be in the gasholder. The per centage from this cause amounts to something more than 1 per cent. You may take the two together at 5 per cent. without being essentially in error. With respect to pressure, I think, for good lighting in the City of London, about an inch is required at the present time at the consumer's meter. I ought to mention that some years ago something like 7-10ths of an inch was considered sufficient, but it has been greatly increased, till it is now about an inch at the meters. The reason is, they put on more lights, but do not always increase the size of the pipes through the premises; therefore you have to force the gas through. With regard to the street lamps, the quantity of gas and the volume of flame vary day and night. As the pressure varies at the works, so the magnitude of the flame varies. In many works this is done: when the lamplighters go out and light the lamps, a very considerable pressure is made, and afterwards that pressure is diminished. The consequence is, the lamplighter turns down his flame.

By Mr. ARCHIBALD: I know it is a very common practice. I will not say it is the practice in the Great Central, because I do not know it. The same thing happens in another way in all works. The lamplighters are sent round before the great bulk of consumption comes on; and, when the consumption comes on, the pressure of gas in the mains is reduced by the friction; and then, of course, the magnitude of the flame diminishes. I was going to state that also as the cause of the diminution of the flame during the lighting hours in the evening, independent of the works. Between four and seven at night, in the middle of winter, the pressure very much diminishes, because the whole town is burning; but, when the lamplighters are sent out at half-past three, they are not all burning; that occurs in nearly all works. All these differences would not be indicated by the pressure-papers at the works. The variation at the extremity of the mains is not shown by the pressure-paper at the works. Take, for instance, the hour of four, or half-past four, in the dead of winter; then a very large pressure will be on at the works, but that large pressure will not be indicated at the extremity of the mains. No pressure will appear at the extremity of the mains. The pressure at Coleman Street will be a fair indication of the pressure when the distribution begins. I have known such a case as this: I have known a pressure at the works to be put on at half-past four p.m., and at the extremity of the pipe there has not been an inch, when the burning has been in full action; then, of course, the consumption is large and the friction is great. I do not mean that that will apply in the case of the Great Central Company. The variations I speak of would, I think, be indicated in the pressure-papers kept at Coleman Street. I have had a great deal to do with gas-works. Independently of those causes I have mentioned with respect to the unaccounted-for gas, there would be other circumstances by which there would be a loss; for instance, the state of the meters; that is one most serious cause of the loss of gas, and it operates in this way: A meter that is put up to register, especially if it is a dry meter, is put up to register accurately in the first instance, but in course of time it ceases to register accurately, and some of the gas escapes without being registered. The general effect is that, as a meter gets old, it registers less gas. With regard to the water-meter, it arises from small perforations in the drum, which gradually enlarge till they become of so much consequence that the company remove the meter and put up another; but, practically, all meters, whether dry or wet, are subject to those influences, ceasing to register correctly after a certain time; that goes on generally increasing from the time at which they are put up, and is most sensible in a new work, where a large number of consumers are taken on in the first instance. It is not so apparent in old works, because in old works they are taking down the meters every day and replacing them with others, and the thing attains a sort of average condition; but with regard to new works, when everything is put up in the first instance, and a large number of consumers are taken on from day to day, they are gradually getting worse. This goes on up to a certain period, when they are gradually taken down—a hundred every two or three months—and replaced, so that they are in a uniform average condition, and there is no apparent increase of leakage from that cause after it has once attained what I may call its maximum amount, and remains at that; not that it would get larger if the meters remained in point of fact, but they do not remain—they begin to change. In reference to meters as a registering instrument, the wet meter is the most perfect, but there are certain conveniences about a dry meter which sometimes make it more favourable. It does not require so often attending to and putting the water right. A slight difference in the level of the water-line does not alter the registration of the meter; it only alters the unregistered circle in the centre, which of course bears a very small ratio to the magnitude of the whole drum. [The table headed "Misappropriation of Gas" was put into the hands of the witness.] There are two anomalies here [referring to the paper], but in other respects there is nothing that strikes me as at all extraordinary. The blue figures, as I take it, indicate the per centage of leakage. It seems very low. The first leakage is 15 8-10ths; the second comes to 16 8-10ths; and in the next year 17 8-10ths. The next year, again, 17 8-10ths; and then comes a year of great amount, of 23 6-10ths.

The UMPIRE: Supposing it was 54,000,000 instead of 89,000,000—what then?

Witness: I do not think it would be an anomaly at all. There is nothing that strikes me as an extraordinary amount of loss in those years with reference to the manufacture. The leakage has increased less than I should have expected; in the year 1852, it is 15 8-10ths, and in the year 1853 it is only 17 8-10ths, and, although the admeasurement of leakage by per centage is not absolutely greater, yet it is nearly so; because, I have mentioned before, the great increase of the leakage arises from the service-pipes, which are increasing in number, and also the leakages from decay, and the meters, which have become less correct. Then I may mention that, with regard to the difference which is occasioned by the increased temperature at the moment of registration, that would amount to something. What I have called the 5 per cent. would be strictly a per centage on each quantity.

Mr. MAY: I want to ask one question, as bearing upon a very important piece of evidence that we have had before us. There is a certain quantity of aqueous vapour in gas of a given temperature—Does the condensation of that vapour alter the bulk of the gas?

Witness: It does, though at first sight it might appear to be otherwise. Very complete experiments, however, have been made, which are related in a book I have before me.

Mr. ARCHIBALD: It is from no experiment of your own?

Witness: No; I have not made the experiment myself, except in this way: we know, with regard to a common tube, if you let into a common tube containing so much gas, something which will dry the moisture out of it—such, for instance, as caustic potash, which will almost immediately take the moisture out of the gas—you will then find the gas occupies a less space than it did before.

By Mr. LLOYD: That is conclusive of the experiments as to the facts. Supposing a less quantity to be manufactured with the same condensing apparatus and the same exposed surface, the cooling would no doubt be greater. As the quantity made increases, other things remaining the same, the temperature of the gas would rise as it entered the station-meter, unless the condensing apparatus is large enough for the maximum quantity; and I believe at the Great Central it is large enough. I made an experiment on that point, and I found the condensing apparatus brought down the temperature closely approximating to the temperature of the atmosphere; and, therefore, I am quite satisfied that the condensing apparatus was very ample. As regards the purifiers, I found at the Great Central there was this curious fact, which was a matter of observation: I found that the compression the gas underwent in the purifier raised the temperature, and that raising of temperature continued throughout the whole of the apparatus extending to the meter. It diminished to some extent afterwards, and then it became increased again by contact with the pipe. Ultimately it became 10° higher than the temperature originally.

Cross-examined by Mr. ARCHIBALD: I attribute some of the leakage of 20 per cent. to the consumers' meters, but I cannot give you the amount. I have not had experience in any works in which dry meters exclusively are used. When I speak of leakage, I include all kind of loss which can be represented by money; that is to say, so much gas is made, and so much money is paid for it, and the difference is the per centage of loss. You may measure it from the returns in money as well as the registration. I know the gas-works at Coventry, but I have not gone into them for some years. I know the gas-works at Liverpool. The leakage there was 14½ per cent. some years ago, but I do not know what it is now. The area of distribution at Liverpool is more extended than the City of London. I do not know what the leakage is at Manchester. In both of those towns the water-meter only is used. At Nottingham the leakage is down as low as 11 per cent. We never had it lower, and that was by extra care in the management. I believe that arose from putting up some thousands of new water-meters; before that the unaccounted-for gas was very heavy, as there were a great many consumers without meters at all. Meters were afterwards put up, and in many cases the old ones were taken away and new ones substituted. I ought to mention that the circumstances were extraordinary. The meters were so new, that I think you may consider there was no leakage from them. The leakage at Manchester has not, to my knowledge, been reduced to 8 per cent. With regard to Manchester, it has been a matter of very frequent observation with me that they pinch the public lights fearfully. The town is lighted by the corporation, and they have the control of the public lamps, which they pinch so much that I have no doubt they consume much less gas than they are estimated at. I have had this subject under my observation repeatedly, and I believe this would account for the nominal reduction of what is called the leakage. There are two ways of ascertaining the amount of leakage; one is by taking the registration at the consumers' meters, adding to that the estimated consumption for the public lights, and comparing the result with the return at the station-meter; the other is by taking the return of the money, and adding to it the amount of bad debts. It would, no doubt, be a fair way of ascertaining the quantity of unaccounted-for gas to take the quantity of gas registered at the station-meter, and the quantity paid on or brought to charge at the consumers' meters, if the sale were all at the same price; but in many companies they do not sell it at the same price. I have no idea what the leakage at the City Gas-Works was; I have never had anything to do with them. I was employed at the time of the bill by the Chartered Company, when the whole matter of the parliamentary opposition was before me, but I am not aware that the question of leakage ever was raised. I should be surprised to hear that their leakage was below 10 per cent., and I should entirely disregard such a statement unless I knew the mode in which they made their estimate. With reference to the experiment I referred to, I satisfied myself that the main was a sound one and free from leakage: it was a well-laid gas-main in a country road. If I had made the experiment with two mains, and had found leakage in one case and none in the other, I should have attributed it to a defective pipe or bad workmanship at the joint. It so happened that at the time I did try it with two mains laid from the same works to different towns, and the results were extremely consistent with each other. Assuming, from the paper put into my hands, that 39,000,000 was the total amount of unaccounted-for gas between June, 1851, and June, 1852, ascertained by comparison of the station-meters with the consumers' meters, and also assuming that the greater portion of the services were laid in that year, and bearing in mind what I have told you as to the state of the works, there are reasons why that absolute quantity should be exceeded in the amount supplied in the subsequent years down to 1856, which I will try to explain. With regard to the first, if you will allow me, I find it stated here that the leakage in 1852 amounted to 15 8-10ths per cent. I should take from that 5 per cent. due to the increase of the temperature of the gas entering the meter: that would reduce it to 10 8-10ths per cent. That would put the leakage, then, on the same footing as in other works, and 10 8-10ths is a remarkably low leakage. Then, pursuing the same course, I take 5 per cent. off 19 7-10ths, and I find the 10 8-10ths, which I will call 11. The 11 then becomes nearly 15 per cent. I find that the increase of leakage is 9,000,000 on 250,000,000. The gas supplied in those years was nearly 250,000,000; there is very little

difference. I compare the two years together. One I find is 39,000,000, and the other 48,000,000, which leaves about 9,000,000 upon 250,000,000. I should not think that 9,000,000 of increase on 250,000,000 a very large increase, considering the state of the ramification of the pipes through the City, and that all the pipes were quite new.

By the UMPIRE: They were not all in the same state; there had been one year's traffic over the pipes, which were perfectly good probably, or as good as pipes usually are in the first year.

By Mr. ARCHIBALD: I assume they were reasonably good in the first year, and the per centage of leakage does not appear to me to induce any other supposition; it is 15 8-10ths, including the 5 per cent., which is certainly not a large loss; and therefore there was no extraordinary leakage in that first year. I am not at all surprised at the increase. In the second year there must have been a good deal of disturbance. I cannot fix upon any reason for the increase; but what appears to my own mind as the reason is this—first of all, that the meters are not so perfect in the second year as they are in the first; and then the services are not so perfect as they are in the first year; then the street mains, which have been subject to a considerable amount of traffic over them, are not so perfect in the second year as they are in the first, from the settlement to which they are liable. When you lay a gas-pipe in the ground, you do not lay it soundly throughout its whole length; it does not rest very well upon hard material. In the first year it will deflect, and it will take all the deflection in the first year, except as to extraordinary circumstances to which it would be afterwards subject. I cannot say that would all occur in the first year; it may have occurred in the first three or six months; it might occur at an early period; and it appears to me that the increase of 9,000,000 is only a very moderate increase to be attributed to those causes, and of course many of these things would not occur in the after years. I have not the means of telling you how soon the disturbances take place; but we know, as a practical fact, that in the early years of gas-works the increase of leakage from this cause is rapid. Afterwards it becomes more steady. Its ratio would not decrease in absolute amount, although the influence from that cause would diminish. With regard to the services, it would be the other way; the ratio of increase would be higher for some time. I could not say that these influences would be exercised chiefly in the first year, because no mortal man can speak of influences of this kind in the early period. I have no means of judging here, and I cannot tell from these papers what the increase has been. There appears to have been a diminution of the quantity made of 1¼ per cent., and an increase in the leakage of 4 per cent. That 4 per cent. is measured upon the diminished, and not the larger quantity, or it would be more than 4 per cent. In reference to the absolute amount of leakage, I should have no difficulty, in my own mind, upon the subject; but of course I cannot speak to the mode of working in that particular year, or to the mode of registering the gas. It might be in that particular year that the water in the meter was kept rather full, or rather low, which would account for a difference in the quantity of make. In gas-works there are twenty contributory causes of leakage. I have only spoken of the larger ones; most of them are very insignificant. I still think that there were causes other than those I have mentioned which would naturally and properly account for that increase of leakage in 1852 and 1853. Assuming the mains improved in condition from 1850 to 1853, I should still be able to account for the increase of leakage, because the amount, as a general rule, is not large. The great amount of loss is in the services and the meters; and I would look for such an increase rather to the meters and services than to the disturbance of the mains from any deflection or traffic. If the gas was supplied without meters at that time, and a comparison were instituted between the registration at the gas-works and the registration at the consumers' meters, that circumstance would go to account for the increase in that year; but if it was measured by money, and the money were taken for the assumed quantity, it would not account for it. I suppose all cases in which gas is supplied without meters are registered, which information would be of such a precise character that there would be no difficulty in making a calculation of the amount consumed; still it would account to some extent for the increased leakage. There is no difficulty in estimating correctly the quantity consumed by contract and without meter, excepting in this particular case: if the gas is given before any meter is put on, and it is estimated before there is any registration per meter, then it becomes a matter of difficulty; but if the gas is consumed during the period that intervenes between the removal of one meter and putting up another, there is no difficulty; it is done every day in every gas-work in the world, because you take the rate of registration before and after, and then make your estimate from it. At Nottingham, I suppose we did not get paid for more than 70 or 80 per cent. of all the gas we delivered by contract. I speak of the contracts for the private lights.

Mr. LLOYD: We have no case of that kind.

By Mr. ARCHIBALD: It is possible that a great increase of leakage or unaccounted-for gas would take place if meters were tilted or put in such a position that they would not register, but that would depend upon the number. If done here and there—one in a thousand—of course it would make very little difference, but if it were a general practice, it would have a very large influence.

Mr. MAY: We have been informed that something analogous takes place in gas-pipes to that which takes place in steam-boilers, viz., that a leak may fill up and become perfectly tight. Is there anything of that kind existing?

Witness: No; we always find that the leakage grows, and the quantity of unaccounted-for gas increases. There is nothing analogous to it.

By Mr. ARCHIBALD: The service-pipes would not be so much deteriorated as regards leakage in a year or two as the mains. The leakage of the mains, where there is a heavy traffic, would certainly considerably increase. As to any effect from the gas in the pipes themselves, as a general rule, the cast-iron gas-main will last 100 years. I do not mean to say there are not particular soils and situations which destroy them. A service-pipe goes with extraordinary rapidity. The two matters are quite of different characters. I found the gas registered at 20° above the atmosphere at the works. I know instances in which gas has been registered below the temperature of the atmosphere at the station-meter, and that is owing to the manner in which the gas is condensed. If there is a long main leading from the purifier to the station-meter, the temperature of the gas may even get below, under certain circumstances, that of the surrounding atmosphere; and it is a curious fact that at the Great Central the gas left the condenser at a temperature of 1° lower than that of the atmosphere. Then it goes to the purifier, and is there heated again, but, as a general rule, where the gas passes through dry lime, its temperature becomes elevated.

By Mr. MAY: It does not do so in passing through wet lime to the same extent, because the chemical increase of temperature has to extend itself to a large extent in raising the temperature of the water. The cases I mentioned of measuring the gas at a lower temperature than the atmosphere are exceptional cases. Upon the average I should think gas is measured at the works between 5° and 10° above the temperature of the atmosphere.

By Mr. ARCHIBALD: Whatever it is, it augments the volume of the gas so that the meter registers more than it ought. In making the estimate for loss by leakage, we never make an allowance for temperature. We simply take the registration at the meter and look at the money returned, or look at the aggregate amount as represented by the consumers' meters and public lights. I should think, comparing one year with another, the influences with regard to temperature would be as much in operation during the whole period. I do not know any reason to the contrary.

Mr. ARCHIBALD: What would be the fair price for gas at the gasholder in London—the works being found for the manufacturer?

Witness: I cannot answer at the moment what would be the fair price for gas at the gasholder, the works being found and repaired by the contractor. I will go into it, and give you an answer by-and-bye. I should want a good deal of information—for instance, the question of illuminating power—is the contractor bound to a certain illuminating power, and is that a high one? That would augment the value of the gas, and augment his cost of manufacture. Ten and a half candles sperm of 120 grains is very low. I should think it very difficult to make such a gas in the ordinary course of manufacture; it could not be done. There is no such gas known commercially. It might average 12. To get 10½ candles from Newcastle coal, you must produce 10,000 feet to the ton, or perhaps more, and that you could not do; you could not afford to produce gas at that rate; you would either burn up the retorts, or you would have to keep the coal so much longer in the retorts, that it would not at all answer your purpose. I do not think it could be done under 20d. per 1000 feet at the gasholder. I take it at 12 candles. I do not think it could be done for less, with a fair profit to the contractor. Ten and a half is really too low a margin—that a man should not be tripped up because his gas is sometimes not of the stated quality. A man would not make gas at 10½; it would not answer his purpose; but in certain states of the weather, and with certain kinds of old coal, he might get down to that limit, but he could not keep at it. I should think a penny per candle per 1000 feet a fair price for increase beyond 12 candles of 120 grains. With regard to public lamps, the pressure at first turning on is not two or three times as high as it is in the morning. The usual rule is to get up the pressure again about five or six o'clock in the morning. I think it proper to do so. I do not know if it is the practice of the Great Central. It ought to be done, because there are a great many shops, cellars, and manufactories that require lighting in the morning.

By Mr. MAY: I am not speaking of the gas at the works, but of the pressure of gas in the mains, and to supply the railway stations; there are thousands that require lighting up in the morning. It has been my practice, and I know the practice of gas companies is to increase the pressure about five or six o'clock in the morning. In a place like London, I should give in the middle of the night a pressure of about 7-10ths; in the morning I should give about an inch; and in the evening I should be obliged to give that pressure which would enable me to force gas through the mains to meet the maximum consumption, and that might amount to an inch and a half on the average of the district.

Re-examined by Mr. LLOYD: In my judgment, the pressure in all cases ought to get up towards morning to supply early risers, shops, manufactories, railway stations, and public-houses, irrespective of markets; and, as far as I know, it is the practice. The minimum leakage at Nottingham I stated at about 11 per cent. I do not think there are many exceptional circumstances that would alter the case as regards a London company beyond the one I gave, and that was, we put up some thousand of new meters, and, as a matter of course, that brought it down very much. Besides that, we certainly took up, which I forgot to mention before, many hundreds of old services, and relaid them, and we found then a very large amount of all the leakages was occasioned by the old services. That is one of the facts on which I base these results; and I may add this fact, which is rather valuable, that our manufactory at Nottingham is almost exactly the same as the Great Central. We manufacture about 1,250,000 feet per night.

By Mr. BARLOW: I think we have about 70 miles of mains, and the mean diameter, I should think, about 5 inches. We have about 9000 meters at work. The average rental of each meter is about £4, as nearly as possible.

By Mr. MAY: It is not £4. 10s.; it is somewhere between £4 and £4. 10s.

By Mr. LLOYD: After all I have heard, I still adhere to the conclusion that there is nothing in that paper of leakages which astonishes me—except in the last year, in which there is, as I mentioned before, a sudden start.

Mr. LLOYD: No allowance is made there for public lamps at all. If you take the public lamps, that will account for it.

Mr. MAY: I do not think that has been properly explained to Mr. Hawksley.

Mr. LLOYD: In the last year the quantity consumed by public lights is taken to the account of "Unaccounted-for gas."

Witness: Then 54,000,000 of the preceding year would grow to 56,000,000. The per centage of that year is 23 6-10ths. It must have been the same as in the normal year, and there must have been a greater increase in consumption by each consumer than arose from the increased number. That appears manifest to me as a gas engineer and looking at the documents. The leakage is the same whether much is consumed in the house or not. You burn so much per hour under a certain pressure.

Mr. LLOYD: You say that would lead you to the conclusion that there had been an improvident and reckless waste of gas before it is brought to charge?

Witness: No, it would not. I see nothing here that is extraordinary.

By Mr. ARCHIBALD: I did not measure the gas at Nottingham at so high a temperature as this is, to begin with; there is not a difference of 20° between the external atmosphere and the temperature at which it goes into the meter.

By Mr. LLOYD: That will explain the increase of the absolute quantity of unaccounted-for gas.

By Mr. MAY: If the gas at the Great Central had been registered at the same temperature as at Nottingham, it would reduce it here to 12 or 13 per cent., as against 11 per cent. as the minimum at Nottingham.

By the UMPIRE: The difference between the quantity of gas registered at the station-meter and sent into the mains for distribution would be nearly the difference I have spoken of—not quite. It would be nearly the difference of 5 per cent., because the temperature of the gas will be lowered in the gasholder to nearly the temperature of the atmosphere; it will lose its moisture and diminish its volume. I ought to guard myself from misleading you. It will not be entirely that, because during the night the gas is going into the gasholders and is coming out of them at the same time, and if the inlet-pipe and outlet-pipe are near each other, the gas goes up one pipe and down the other without remaining any sensible time; and in that case the whole of the condensation would have to take place in the main instead of in the gasholder; and, inasmuch as the main of the Great Central is two miles and a

half long before it begins its distribution in the City, I apprehend that the diminution of volume and the abstraction of humidity would be pretty nearly the same, because the mean temperature of the earth would bring the bulk down in very much the same degree as the mean temperature of the air. They are as nearly as possible consistent with each other; there is very little difference.

By Mr. MAY: There are well-ascertained data on which to calculate the diminution in pressure in passing along mains; that is to say, supposing we have 30-10ths pressure at the works, and we are passing a given amount of gas per hour through a 26-inch main, we can tell within one or two tenths what the pressure will be two miles and a half off. The law of resistance in passing through pipes is perfectly well known; there is no doubt on that subject. Of course something will depend on whether the main is free from water; it may be that there are obstructions in the main. You could find out those obstructions without seeing them. If you had a number of gauges, you would find there would be some diminution between two of the gauges, and that would indicate between those two points there is some sort of stoppage.

Mr. CROLL: And the quantity of gas sometimes sent up varies.

Witness: It should not during the time of an observation. The pressure from the gasholder should be consistent, and for a minute or two the consumption in the City should be the same. If you make experiments, you must make them over a short time. A single experiment must be made in the shortest possible time.

By Mr. MAY: Supposing we take 16 or 20 consecutive quarters of an hour, and there are 6 or 8 stations for observing, and those observations are taken at the same moment, but at the end of so many quarter-hours, this would result—that, having the dimensions of pressure, we can calculate with the diameter and the length of the pipe the quantity of gas gone through; or, reversely, having the quantity of gas and the dimensions of the pipe, we can calculate the diminution in pressure. These laws are well known. There is nothing, indeed, to learn on that subject; calculations have been submitted to the test of experiment, and the test comes out consistently with the calculation, which is a better way than making the experiment first and the calculation afterwards.

By the UMPIRE: If the works were at Aldgate and the gas were delivered immediately to the consumers at Aldgate, the same quantity would not be delivered as there would be from a distance of 2½ miles. There would be a slight difference arising from the condensation of the volatile oils; it is very slight, and is represented by no more than is pumped out at the syphons. It would not make a ½ per cent. in the volume of gas. There is a greater diminution, though that is only a slight one, from the condensation of moisture than there is from deposition of volatile oils.

Mr. CROLL: I ask, with reference to the evidence that Mr. Hawksley has been giving, that we may now have facility for taking the temperature of the gas in its passage going out of the works.

Mr. LLOYD: After it has left the works.

Mr. WRIGHT: I should like to take it as well, if it is to be done.

The UMPIRE: We must have it.

Mr. WRIGHT: I do not want to agree on one experiment.

(To be continued.)

Miscellaneous News.

COMMITTAL OF A GAS RENT COLLECTOR FOR EMBEZZLEMENT.—A collector, in the service of the Leeds New Gas Company, named Joseph Silversides Bell, has been apprehended on a charge of embezzling several small sums of money, the property of his employers. The prisoner is married, is 45 years of age, and lived in Marshall Street, Holbeck. He underwent a preliminary examination at the Court House, on Wednesday, and was again brought up on Thursday. He was defended by Mr. Simpson, Mr. Blanshard (instructed by Messrs. Snowdon and Emmet) appearing for the prosecution. The evidence adduced was to the effect that the prisoner had been in the service of the New Gas Company for about five years, as clerk and collector, and that he left about the 19th of April. Some defalcations were discovered in his accounts, and a warrant was procured for his apprehension, on hearing of which he gave himself up. It was his duty to enter in his cash-book all the sums of money which he received, and to pay them over, day by day, to Mr. Henry Hall, the secretary of the company, or to Mr. J. R. Bywater, the manager. It was shown that in three instances, at least, he had neglected to do so. He received £3. 15s. 4d. from Mr. John Blakey, landlord of the Smith's Arms, New Wortley, on the 11th of March last; £9. 19s. 9d. from Mr. Wm. Ferns, pail and perambulator manufacturer, Leeds, in December last; and £3. 2s. 9d. from Mr. Joseph Ardill, landlord of the Albion Hotel, Jack Lane, Hunslet, on the 11th of March last; and he had not entered any of those payments in his cash book, or accounted for the money. The prisoner was provided with a book containing printed forms of receipt, and on the counterfoil bearing the number corresponding to the one on the receipt given to Mr. Blakey, was entered a sum of money, upwards of £13, which he had received from Messrs. Chadwick, dyers, and properly accounted for. Mr. W. Chadwick, however, proved that the prisoner had not given him a receipt on a printed form, but had acknowledged the payment in a book belonging to him (Mr. Chadwick). The prisoner, who made no defence, was committed for trial at the sessions, and bail was refused. Mr. Blanshard asked the Bench to bind over Mr. Hall to prosecute, instead of, as is the usual course, constituting the chief constable the nominal prosecutor. His reason for doing so was that it would be more convenient for the prosecution to be conducted at the sessions by Messrs. Snowdon and Emmet, the solicitors to the New Gas Company. Mr. Barr said that when the prosecution was taken out of the ordinary course, it was usual for the parties to pay the expenses, and not throw them upon the borough. Mr. Blanshard said his clients would take the chance of having to pay the costs of the prosecution, and the magistrates made the order as requested. We understand that the deficiencies in the prisoner's accounts, as at present ascertained, amount to about £80.

Price Current.

CASTINGS, per Ton.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorkshire, Derbyshire and Staffordshire.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1¼ and 2 inches Socket Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 „ „ „	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 „ „ „	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
6 in. & upwards „ „	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
„ 2nd „ cold „	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ¼ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

COALS.

NEWCASTLE.	s. d.		SCOTCH CANNEL.	per ton.
Unscreened.				
Whitwell Primrose	6 3	per ton	Boghead, at Leith	32s. 0d.
Medomsley and Burnhope.	6 6	„	Kirkness, best	23 0
Pelaw	6 9	„	Capeldrae, 1st quality	20 0
Eighton Moor, New Pelton, Peareth, South Pelaw, Washington Hutton, & South Peareth	7 0	„	„ 2nd „	12 6
			Lesmahago, at Glasgow	25 0
			„ „ Leith	27 6
			Arniston	22 0
			Wemyss	20 0
			Knightswood	18 0
Pelton	7 9	„	Pirnie	15 0
Ramsay's Newcastle Cannel	16 0	„		

SUNDRIES.

Best Newcastle fire-bricks	60s. per 1000	English pig lead	£22 per ton
„ „ clay	12s. per ton.	Welch bar iron, in London	£7. 5s. „
Cliff's fire-bricks at Wortley, 57s. 6d. p. 1000		Foreign spelter	£25 „
Ingham's fire-bricks at Wortley, 55s. p. 1000		English block tin	£118 „
Tough cake copper	£107. 10s. per ton.	Banca „	£115 „
Tarred rope yarn	26s. per cwt.		

WROUGHT-IRON TUBING, subject to 40 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
„ „ „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
„ with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	

FREIGHTS.

Coastwise—Newcastle.	Per Ton.	*Foreign.*	Per Keel.
Chatham & Roches-	5s. 3d	Boulogne & Calais	£ 7 0s
Cork [ter	8 0	Barcelona	22 0
Dover	—	Bordeaux	£13. 10s. to 14 0
Dublin	8 6	Cadiz	£15 to 15 15
Exeter Quay	7 6	Copenhagen	£9 to 9 10
Folkestone	5s. 8d. to 5 6	Dieppe	£7. 10s. to 7 15
Hastings	7 0	Genoa	£20. 10s. to 21 0
London	5s. 3d. to 5 6	Hamburg	7 10
Lowestoft & Yar-	4 3	Havre	8 5
Lynn [mouth	4 9	Leghorn	£20 to 20 10
Portsmouth	6 6	Lisbon	15 0
Plymouth	7 0	Rotterdam	£6. 15s. to 7 0
Whitstable	5 6	Stettin	11 0
Weymouth	6 6	Trieste & Venice	£21 to £24

Advertisements.

CYRUS HANSON,
HENLLIS WORKS,
NEWPORT, MONMOUTHSHIRE,
Manufacturer of Clay Retorts, Fire-Bricks, &c.

ROBERT MACLAREN & CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

GAS-WORKS ERECTED, ALTERED, VALUED, OR LEASED, BY
GEORGE WALCOTT,
GAS AND CONSULTING ENGINEER,
BEAUMARIS GAS-WORKS, ANGLESEA,
who has erected twenty Gas-Works during the last four years, all of which are giving satisfaction.
London Office, 24, Abchurch Lane, CITY.

MR. WILLIAM RICHARDSON,
Consulting Engineer and Contractor,
DUDLEY, near BIRMINGHAM.

WILLIAM STEPHENSON & SON,
THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES
&c. &c.
LONDON OFFICES:
76, KING WILLIAM STREET, CITY.
A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIE & Co.'s Wharf, 64, Bankside, SOUTHWARK.

WILLIAM INGHAM AND SONS,
WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of
RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,
beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.
The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.
GAS OVENS IN SEGMENTS OF EQUAL QUALITY.
London Agents, CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.
N.B.—*Export orders continue to have prompt attention.*

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,
WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior service.
To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.
THE WORKS ARE WELL SITUATED
For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.
FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.
M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

LIVESEY FIRE-CLAY WORKS,
NEAR BLACKBURN, LANCASHIRE.
ORLANDO BROTHERS,
MANUFACTURER OF PATENT CLAY RETORTS,
AND EVERY DESCRIPTION OF
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

FIRE-CLAY RETORTS.
JOHN SWARBRICK,
MANUFACTURER OF PATENT COMPOSITION CLAY RETORTS,
FIRE BRICKS OF EVERY DESCRIPTION, SHAPE, AND SIZE, &c. &c.
HIGHER EANAM, BLACKBURN, LANCASHIRE.

These RETORTS are generally used in the Gas-works of Preston, Accrington, Bury, Heywood, Middleton, Rochdale, Ratcliffe; the Mills of Messrs. Horrocks, Miller, and Co., Preston, &c. &c., and are unequalled in having afforded general satisfaction to those who have given these Retorts a trial.
To meet the increasing demand, the Works at Little Harwood have been greatly enlarged; and Gas Engineers who may favour with an Order may rely with confidence on their being promptly supplied with an article not to be surpassed in finish or durability.

PRICES MODERATE.

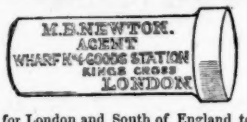
TO GAS COMPANIES, GAS PROPRIETORS, AND GAS ENGINEERS.
JOHN VICKARY

begs to call the attention of the above to his improved METALLIC CASE GAS-METER, an improvement which has met with entire approbation from the various Gas Companies and Engineers to whom he has introduced it, and acknowledged to be the greatest improvement that has been made since the year 1832; at which period a metal was introduced for the construction of the Drum, Syphon, and Float, capable of resisting any impurities arising from either gas or water, which has been found to answer every expectation; as, in repair, Drums of the above date are found in perfect and good condition, when the Outer Case, Valve-box, Inlet-pipe, &c., are quite destroyed and entirely past repair.
J. V. has introduced a coating or lining of the above metal in the Outer Case, Valve-box, Inlet-pipe, &c., thereby rendering the whole as durable as the Drum, as not a particle of tin plate is exposed to the action of either water or gas; and preventing the possibility of gas passing above the water line through the front into the body of the Case to the outlet unregistered, which frequently occurs. When the Meter has been in use for any length of time it is generally found that rust or decay takes place *above* rather than under the water line, which is only discovered when they need repair. Also the Inlet-pipe and Valve-box are generally found quite decayed, which cannot happen in the above improvement.
J. V. feels confident that the above will be found a most desirable and perfect instrument, as it contains all other improvements of utility that have been introduced up to the present time.
The most strict attention is given to the workmanship as well as the registration of every Meter, to render them perfectly accurate.
Station Meters, Governors, &c., made on the shortest notice, as well as Gas Cooking Apparatus of every description, Gas Baths, &c.
Meters sent at the lowest London prices.

Carriage paid to any part of England.

WEST OF ENGLAND GAS METER AND GENERAL GAS APPARATUS MANUFACTORY, 84, FORE STREET, EXETER.

J. CLIFF'S
FIRE BRICKS, GAS RETORTS, &c.



Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 13, Westbourne Terrace, BARNSBURY PARK (N.).

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).

DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

WEST and GREGSON,
GAS-METER MANUFACTURERS, &c.
UNION-STREET, OLDHAM.

Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

WHITEHOUSE and CO.,
BOILER & GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
WEDNESBURY,

Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.
Orders promptly executed.

NOW READY.

VOL. VI. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1857, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., and V. are still on sale.
W. B. KING, 11, Bolt Court, Fleet Street.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by numerous Gas Companies in England and abroad, and their advantages and great security fully proved. Very large numbers are in use. Prices from 11s. 6d. to 13s. 6d. per inch diameter.
BRYAN DONKIN and Co.,
Engineers, near Grange Road, BERMONDSEY.

NOTICE.—INFRINGEMENT OF PATENT.

CRICKMER'S Patent Metallic Packing for Steam-Engines, Pistons, Piston-Rod Stuffing-Boxes, Pumps, &c.—Notice is hereby given that a perpetual Injunction of the High Court of Chancery has been obtained by Messrs. OASTLER and PALMER, trading under the Firm of ALEX. ROSS and CO., Grange Mills, Bermondsey, against Messrs. LITTLE and CHAMBERS, of Manchester, to restrain them from further infringing the above Patent; and that the above Packing can only be obtained of Messrs. ALEX. ROSS and CO., Grange Mills, Bermondsey, LONDON (the Proprietors of the Patent), or by their authorised Agents.
MILL BANDS, HOSE PIPES, & FIRE BUCKETS made to order from the best-selected Oak-Bark Tanned Leather.
Prices Current to be had on application.

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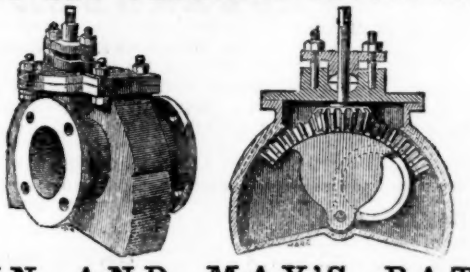
Manufacturer of
IRON TANKS for Gasholders, Railway Stations, &c.
GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.
GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.
WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.
IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.
PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.
Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.
Can be taken to pieces without being removed from the line of Piping.
NORTH WILTS FOUNDRY, DEVIZES.
Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C.,
Where a Sample may be seen.

WILLIAM PARKINSON AND CO.,
(Successors to the late Samuel Crosley),
COTTAGE LANE, CITY ROAD, LONDON,
Beg to announce that, in addition to the manufacture of GAS-METERS, they continue the manufacture of METERS for MEASURING WATER, SPIRITS, &c., commenced, under Patent in 1849, by the late Mr. William Parkinson.
These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

By Royal Letters Patent.

KAY'S
PATENT EQUITABLE GAS-METER
is the most effective preventive of fraud by "tilting," and is as simple in construction as the common meter.
Manufactured only by
W. COWAN,
60, BUCCLEUCH STREET,
EDINBURGH.

By Her Majesty's Royal Letters Patent.

JOSEPH BOULTON,
PATENT DRY GAS-METER MANUFACTURER, and also Maker of his Improved WATER METERS.
No. 28, BAGNIGGE-WELLS-ROAD, CLERKENWELL, adjoining the Police Office.—Late of No. 1, Coppice-row, LONDON.
Experimental and Station Meters of any size made to order on the shortest notice.—Governors, Pressure Registers, Gas-cooking Stoves, and every description of Gas Apparatus.

HARRIS AND PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY,
MANUFACTURERS OF
FIRE BRICKS GAS RETORTS &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BUTTERFIELD and DEMPSTER,
GAS ENGINEERS, & CONTRACTORS
FOR THE
Erection of New and Repairs of Gas-Works,
NEW ROAD, ELLAND, AND 15, HOLDEN STREET, HALIFAX, YORKSHIRE,
Beg most respectfully to call the attention of Gas Companies and Gas Proprietors to their DOUBLE-GROVED FIRE-BRICK RETORTS, now extensively used in many of our large Gas-Works, and giving universal satisfaction, many of which have been at work for the last 14 years, and are still in good working order. Their capabilities of being heated to a more intense heat than iron, and the small annual cost for repairs, make them an article better adapted to Gas Companies and Proprietors than any other at present before them. The great saving in labour attending the use of our Retorts in the manufacture of Gas has made them more general in many of the large Gas-Works, they particularly recommending themselves.
No. 1—1 ft. 6 in. wide, any length.
No. 2—3 ft. wide do.
No. 3—4 ft. wide do.
No. 4—5 ft. wide do.
No. 5—Set of three to one Fire, viz.—one 4 ft. wide at the top, and 15 in. each side of Furnace.
No. 6—Set of three to one Fire, viz.—one 5 feet, and one 18 in. each side of Furnace.
Iron and Fire-Clay Retorts set on the most improved principle.
Cast-Iron Retorts, Condensers, Purifiers, all sizes.
Hydraulic Centre-Valves, for working two, three, or four Purifiers alternately.
Gas Governors, Cast-Iron Pipes, and every description of Gas Castings at the cheapest possible prices.
Plans and Specifications prepared for every description of Apparatus in the Manufacture and Distribution of Gas.
Testimonials and References forwarded on application.

J. JONES, Iron Merchant, 6, Bank-
SIDE, has long been known to sell the following Castings at prices lower than any other house in London:—Socket and Flange Pipes, Bends, Branches and Tees, Syphons, Lamp-posts, Rain-water Pipes, &c.; also, Hot Water Pipes, Elbows, Tees, Cylindrical and Saddle Boilers, and every Fitting for the same. Drawings and Prices of the above on application to J. JONES, Iron Bridge Wharf, 6, BANKSIDE, near the Southwark Iron Bridge.

ALFRED PENNY,
ENGINEER,
WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Cold-blast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.
*** Country orders executed with care and despatch.

BENJAMIN GIBBONS, Jun.,
DEEPDALE FIRE-CLAY AND BRICK WORKS,
Near DUDLEY,
Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.
FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.
B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.
References given, if required.

GEORGE CUTLER,
GASHOLDER MAKER,
No. 8, WENLOCK-ROAD, CITY-ROAD,
LONDON.
Contracts for Tanks, Gasholders, Roofs, Purifiers, and all descriptions of Gas Apparatus executed on the most reasonable terms. Improved Slide Valves, Steam, and Range Boilers, and Smiths' Work, of the best materials and workmanship.

JOHN BENT,
MANUFACTURER OF GAS METERS,
283, BELL BARN ROAD,
BIRMINGHAM,
(Established 1830),
Begs respectfully to call the attention of Gas Companies, Engineers, &c., to his WET GAS METER, made upon the most improved principles, the most admirable materials, and warranted to register correctly.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas Works and Water Works.
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

PADDON AND FORD,
PATENT GAS-METER & APPARATUS WORKS,
GRAY'S-INN-ROAD, LONDON,
Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.
Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,
55, MILLBANK STREET, WESTMINSTER.
CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.
THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.
BISULPHURET OF CARBON TEST, £2. 2s.
APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.
REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.
STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &c.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
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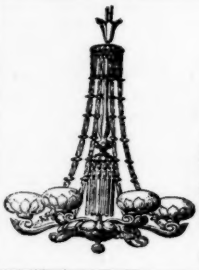

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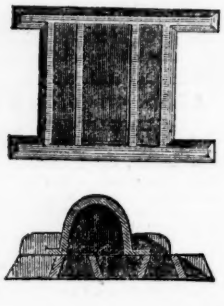
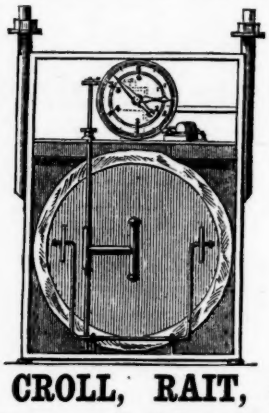
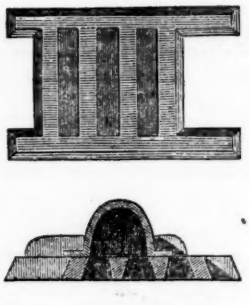




OLD VALVE.



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